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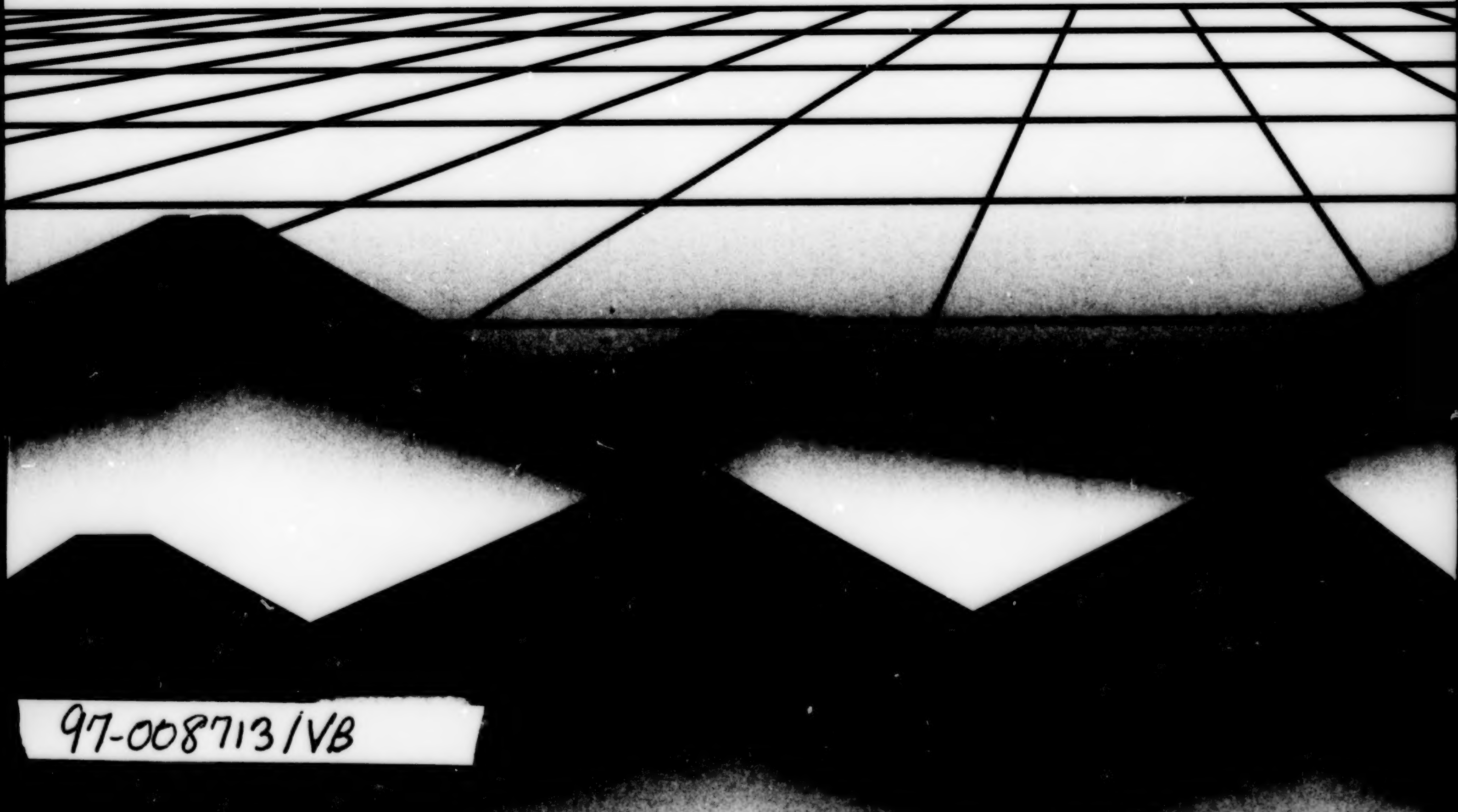
WOMEN, MINORITIES, AND PERSONS WITH DISABILITIES IN SCIENCE AND ENGINEERING: 1996



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WOMEN, MINORITIES, AND PERSONS WITH DISABILITIES IN SCIENCE AND ENGINEERING: 1996

NATIONAL SCIENCE FOUNDATION

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FOREWORD

In an increasingly global economy, making full use of all of the Nation's human resources is essential to successful international competition, world leadership in science and engineering, and an improved quality of life in the United States. Different perspectives, talents, and experiences produce better ideas and ultimately better goods and services to meet the needs of increasingly diverse markets in the United States and abroad. We need to involve all of the Nation's human resources in science and engineering to stimulate creativity, innovation, and change; contribute to the advancement of science and engineering; and foster a scientifically literate population.

We need to encourage all of the Nation's people to participate in science and engineering at each stage of the educational process and in the workforce. Some groups—women, minorities, and persons with disabilities—traditionally have not fully participated in science and engineering. Progress has been made in the achievement and participation of some of these groups but not consistently or at the same rate.

This report, the eighth in a series of biennial reports to the Congress, the administration, and others who direct public policy, presents data on participation of underrepresented groups in science and engineering. It also documents factors important to success in science and engineering in precollege education, undergraduate and graduate education, and employment. The data and analyses presented here can be used to track progress, inform development of policies to increase participation in science and engineering, and evaluate the effectiveness of such policies.

Neal Lane

Neal Lane
Director

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The National Science Foundation promotes and advances scientific progress in the United States by competitively awarding grants for research and education in the sciences, mathematics and engineering.

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ABBREVIATIONS

ACT	American College Testing
ADA	Americans with Disabilities Act of 1990
AP	Advanced Placement
BIA	Bureau of Indian Affairs
CIRP	Cooperative Institutional Research Program
EWC	Engineering Workforce Commission
GRE	Graduate Record Examination
HACU	Hispanic Association of Colleges and Universities
HBCU	Historically Black College or University
HEGIS	Higher Education General Information Survey
HES	Higher Education Survey
IPEDS	Integrated Postsecondary Education Data System
NAEP	National Assessment of Educational Progress
NCES	National Center for Education Statistics, U.S. Department of Education
NIH	National Institutes of Health
NPSAS	National Postsecondary Student Aid Study
NSF	National Science Foundation
R&D	research and development
S&E	science and engineering
SAT	Scholastic Aptitude Test
SDR	Survey of Doctorate Recipients
SED	Survey of Earned Doctorates
SIPP	Survey of Income and Program Participation
SME	science, mathematics, and engineering
SRS	Division of Science Resources Studies, National Science Foundation
SESTAT	Scientist and Engineer Statistics Data System

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HIGHLIGHTS

Women, minorities, and persons with disabilities have historically been underrepresented in scientific and engineering occupations. Some progress has been made over the last several decades, especially in degrees to women, but there is still room for improvement. Women and minorities take fewer high-level mathematics and science courses in high school; earn fewer bachelor's, master's, and doctoral degrees in science and engineering; and are less likely to be employed in science and engineering than are white males.

Women

Course Taking in Elementary/Secondary Education

Female students are similar to males in mathematics course taking at all levels. About 80 percent of both male and female high school graduates in 1992 had taken algebra I, 69 percent of males and 72 percent of females had taken geometry, 21 percent of both had taken trigonometry, and 10 percent of both had taken calculus. Female students were also about as likely as males to have taken advanced placement calculus: 5 percent of females and 6 percent of males.

In science course taking, male and female 1992 high school graduates did not differ greatly, except in physics. Similar percentages of both male and female high school graduates had taken biology and chemistry: 92 percent of males and 94 percent of females had taken biology and 54 percent of males and 57 percent of females had taken chemistry. Male students, however, were more likely than females to have taken physics: 28 percent of males and 21 percent of females had taken physics. Male students were also more likely than females to have taken advanced placement physics. Female students have made gains over the last several years, however: in 1982, only 9 percent of women had taken physics in high school.

Science and Mathematics Achievement

Male and female students have similar mathematics proficiency on the National Assessment of Educational Progress (NAEP) mathematics assessment at ages 9, 13, and 17, although males' scores are slightly higher. In 1992, 82 percent of males and 81 percent of females scored at or above 200 at age 9, 78 percent of both sexes scored at or above 250 at age 13, and 60 percent of males and 58 percent of females scored at or above 300 at age 17.

Female students score lower than male students on the NAEP science assessment at ages 9, 13, and 17. Although the differences are small (from 1 to 3 percent lower), they are statistically significant and have been persistent since 1970. The gap between males' and females' science achievement is greatest at age 17, although female students' scores increased significantly since 1982.

Transition to Higher Education

On the mathematics component of the SAT, scores for both sexes have risen during the decade since 1984. Nevertheless, in 1994 females continued to score considerably below males, the gap narrowing only slightly over the decade. Since 1984, female scores increased 11 points to 460 in 1994, whereas male scores increased 6 points to 501. Females were also much less likely than males to place in the top range of scores (i.e., in the 600 to 800 range) on the mathematics component of the SAT. In 1994, only 14 percent of females scored in the top range versus 24 percent of males.

Differences between females and males in their intended preference for degree major are striking for students planning to enter college. Thirty-one percent of males and 13 percent of females intended to pursue natural science, mathematics, or engineering fields.[1]

Undergraduate Education

Among first-year students planning science or engineering majors in 1994, women's grades were higher than men's: 47 percent of women and 43 percent of men had average grades of A in high school.

---

[1] Included are the fields of agriculture/natural resources, biological sciences, computer sciences, mathematics, and the physical sciences.

Bachelor's Degrees

Women earned a smaller proportion of total science and engineering degrees (45 percent in 1993) than they did of non–science-and-engineering degrees (58 percent).

- Within the sciences, the field with the highest share of bachelor's degrees awarded to women was psychology (73 percent). Women also earned 68 percent of baccalaureates in sociology, and more than half (52 percent) of the baccalaureates in biological sciences.
- Engineering continued to be one of the least popular fields for women; in 1993, they earned 16 percent of all baccalaureates in engineering.
- In most science and engineering fields, women earned a higher proportion of bachelor's degrees in 1993 than they did in 1983. In three fields, computer science, economics, and sociology, however, women's share of bachelor's degrees decreased since 1983.

Graduate Education

In 1993, 36 percent of graduate students enrolled in science and engineering fields were women, up from 32 percent in 1988. In science fields, women constituted 44 percent of the total number of graduate students; in engineering, 15 percent. Within science fields, women were a substantial majority of graduate enrollments in psychology (70 percent) and more than half the total in biometry/epidemiology, genetics, nutrition, anthropology, linguistics, and sociology.

Master's Degrees

The proportion of women earning master's degrees in science and engineering fields reached 36 percent in 1993, having steadily increased from 31 percent a decade earlier. In engineering, one of the fields in which women are least represented, the percentage of master's degrees earned by women increased from 9 to 15 percent between 1983 and 1993.

Doctorates

Women earned 30 percent of the science and engineering doctorates awarded in 1993, up from 25 percent of the total in 1983. Their proportions varied considerably by field: 61 percent in psychology, 40 percent in biological sciences, 37 percent in social sciences, 23 percent in mathematical sciences, 16 percent in computer sciences, and 9 percent in engineering.

Employment Levels and Trends

Women are 22 percent of the science and engineering labor force. Within science and engineering, women are more highly represented in some fields than in others. Women are more than half of sociologists and psychologists but are only 9 percent of physicists and 8 percent of engineers.

Among recent bachelor's science and engineering graduates, women are less likely to be in the labor force, to be employed full time, and to be employed in their field than are men. Women constituted 44 percent of the 1992 bachelor's science and engineering graduates but are 58 percent of those out of the labor force (i.e., not employed and not seeking employment), 54 percent of those employed part time, and 47 percent of those employed full time outside their field.

Unemployment rates of men and women recent bachelor's graduates do not differ greatly: 4.1 percent of female and 4.7 percent of male 1992 bachelor's science and engineering graduates were unemployed in April 1993. Among doctoral scientists and engineers, women are more likely than men to be unemployed, although the difference is small. The unemployment rate for doctoral women in 1993 was 1.8 percent; for men, it was 1.6 percent.

Women scientists and engineers are more likely than men to be employed in academia, but among academics, women are less likely than men to be in science and engineering. Women are 44 percent of faculty in non–science-and-engineering fields but only 24 percent of science and engineering faculty. Women faculty differ from men in terms of teaching field, type of school, full- or part-time employment, contract length, primary work activity, productivity, rank, and tenure.

- Within science and engineering, women are 43 percent of psychology faculty and 31 percent of mathematics faculty but only 14 percent of physical science and 6 percent of engineering faculty.
- Women science and engineering faculty are far less likely than men faculty members to be employed in research universities and are more likely to be employed in 2-year schools.
- Women science and engineering faculty are much more likely than men to teach part time (40 percent versus 25 percent), and women are more likely than men to have fixed-term contracts. Fifty-four percent of women science and engineering faculty are on a one-term or 1-year contract, compared with 34 percent of men.
- Fewer women than men science and engineering faculty have a PhD degree. A far higher proportion of women (42 percent) than men (24 percent) faculty have a master's degree as their highest degree.

- Women are less likely than men to be engaged in funded research, to be a principal investigator or co-principal investigator, or to have published books or articles in the previous 2 years. These differences remain even with research universities and among all age groups.
- Among full-time science and engineering faculty, women are less likely to chair departments. Only 11 percent of women, but 14 percent of full-time men science and engineering faculty, chair their departments.
- Women scientists and engineers hold fewer high-ranked positions in colleges and universities than men. Women are less likely than men to be full professors and are more likely than men to be assistant professors or instructors. Part of this difference in rank can be explained by age differences, but differences in rank remain even after controlling for age. Among those who received their doctorates 13 or more years ago, 72 percent of men but only 55 percent of women are full professors.
- Women are also less likely than men to be tenured or to be on a tenure track. Forty-three percent of full-time employed women science and engineering faculty are tenured, compared with 67 percent of men.

Among doctoral scientists and engineers employed in industry, women and men having a similar number of years of professional experience are equally likely to be in management. For example, among those who received degrees between 1970 and 1979, 32 percent of both women and men are managers.

Within science and engineering, women tend to be more highly represented in fields with lower average salaries. The 1993 median starting salary for recent women bachelor's science and engineering graduates was lower than that for men overall, but within fields, the median starting salaries were more nearly the same. Among more experienced bachelor's scientists and engineers, the gap between men's and women's salaries is larger.

A substantial salary gap exists between men and women with science and engineering doctorates. Almost 90 percent of the observed $13,200 gap, however, can be explained by differences between men and women on the following variable groups: years from doctorate degree, science and engineering degree field, other background variables, work-related employee characteristics, employer characteristics, type of work performed, and indicators of "life choices."

Minorities[2]

Elementary/Secondary Education

Course Taking

Both science and mathematics course taking by minorities have increased over the last decade. The percentages of black, Hispanic, and American Indian students taking many basic and advanced mathematics courses have doubled between 1982 and 1992. For example, 30 percent of black high school graduates in 1982 had taken geometry and 1 percent had taken calculus. By 1992, this had increased to 60 percent and 7 percent, respectively.

Substantial differences in course taking by racial/ethnic groups remain, however. Black and Hispanic high school graduates in 1992 were far less likely than white and Asian students to have taken advanced mathematics courses and far more likely to have taken remedial mathematics courses. Thirty-one percent of black, 24 percent of Hispanic, and 35 percent of American Indian graduates, compared with about 15 percent of white and Asian graduates, had taken remedial mathematics in high school. Although about 60 percent of both white and Asian students had taken algebra II, less than half of blacks, Hispanics, and American Indians had taken this course. Asians were most likely of any racial/ethnic group to have taken advanced mathematics courses. Almost one-third of Asians had taken trigonometry, and one-fifth had taken calculus. By contrast, 22 percent of whites, 13 percent of blacks, 15 percent of Hispanics, and 10 percent of American Indians had taken trigonometry and far fewer took precalculus or calculus.

Blacks, Hispanics, and American Indians are taking more science classes than they took in the past. The percentage of blacks and Hispanics taking chemistry and physics doubled between 1982 and 1992. In 1982, 22 percent of black and 17 percent of Hispanic high school graduates had taken chemistry. By 1992, this had increased to 46 percent and 43 percent, respectively. In 1982, 7 percent of blacks and 6 percent of Hispanics had taken physics; by 1992, 18 percent of blacks and 16 percent of Hispanics had taken physics.

Despite gains, racial/ethnic differences persist in high school science course taking. Black and Hispanic students are far less likely than white students to have taken advanced science courses. Although black and Hispanic high school graduates are about equally likely as white and Asian students to have taken biology, they are much less likely than whites and Asians to have taken chemistry or physics. Only 46 percent of black, 43 percent of Hispanic, and 33 percent of American Indian high school graduates had taken chemistry compared to 58 percent of white and 67 percent of Asian high school graduates. Although 42 percent of Asian and 26 percent of white students had taken physics, less than 20 percent of black, Hispanic, and American Indian students had taken physics in high school.

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[2] Topics covered in this report are presented for five racial/ethnic groups: white, black, Hispanic, Asian, and American Indian. The term "minority" includes all groups other than white; "*underrepresented* minorities" includes three groups whose representation in science and engineering is less than their representation in the population: blacks, Hispanics, and American Indians.

Achievement

NAEP mathematics assessment scores improved for white, black, and Hispanic students at ages 9, 13, and 17 between 1982 and 1992. Gains for black and Hispanic students were higher than those for white students. In 1992 for example, 13 percent more black 17-year-olds and 18 percent more Hispanic 17-year-olds, compared with 12 percent more white 17-year-olds, scored at or above 300 than had scored that high in 1982.

Despite these gains, mathematics scores for black and Hispanic students remain substantially lower than those of white students at all three age levels. The median scores for black and Hispanic students at all three age levels are lower than the 25th percentile scores for white students.

NAEP science assessment scores increased for students at ages 9, 13, and 17 between 1982 and 1992, although scores for some racial/ethnic groups increased more than others. The gap between black and white and between Hispanic and white science scores narrowed for 9-year-olds between 1982 and 1992. Fifty-one percent of black 9-year-olds scored at or above 200 in 1992, compared with 39 percent in 1982, a 12-percentage-point increase. The percent of Hispanic 9-year-olds scoring at or above 200 increased from 40 percent in 1982 to 56 percent in 1992, a 15-percentage-point increase. The comparable gain for white 9-year-olds was from 78 percent in 1982 to 86 percent in 1992, a 7-percentage-point increase. No narrowing of the gap was evident for black or Hispanic 13-year-olds or 17-year-olds. Despite these gains, scores for whites are substantially higher than those for blacks and Hispanics at all age levels, and differences are greatest at age 17.

Schools, particularly secondary schools, in urban areas with a high proportion of economically disadvantaged or a high proportion of minority students offered less access to science and mathematics education. Many factors contribute to unequal participation of minorities in science and mathematics education, including tracking, judgments about ability, number and quality of science and mathematics courses offered, access to qualified teachers, access to resources, and curricula emphases.

Being labeled by ability is very important to student achievement because teachers tend to have different expectations of students in the various groups. Teachers in "high-ability" classes are more likely than "low-ability" classes to emphasize the development of reasoning and inquiry skills. Students in "low ability" classes are more likely to read from a textbook and less likely to participate in hands-on science activities, are more likely to spend time doing worksheet problems, and are less likely to be asked to write reasoning about solving a mathematics problem.

Minority students also have less access to qualified teachers. Mathematics classes with a high proportion of minorities are less likely than those with a low proportion of minorities to have mathematics teachers with majors in the field.

The instructional emphases in largely minority classes are likely to differ as well. The teachers in science and mathematics classes having a high minority enrollment are more likely to emphasize preparing students for standardized tests and are less likely than those in classes having fewer minority students to emphasize preparing students for further study in science or mathematics.

Transition to Higher Education

On the mathematics component of the SAT, the scores of every racial/ethnic group improved over the decade. In 1994, Asians continued to have the highest average mathematics SAT scores, followed in order by whites and American Indians, Latin Americans, Mexican Americans, Puerto Ricans, and blacks. Asian students also achieved the highest increase in mathematics scores of any racial/ethnic group, with scores rising 16 points over the decade. Black students achieved the second highest increase in scores (15 points), and American Indian students achieved a 14-point increase.

The amount and type of coursework taken in high school are related to the scores achieved on the SAT. In particular, Asians and whites, the two groups with the consistently highest mathematics scores on the SAT, were also the two groups who had taken the most courses in mathematics and natural science in high school.

The SAT data show that for every racial/ethnic group, higher reported levels of parental income are generally associated with higher scores on both the verbal and mathematics sections of the SAT. Family income does not uniformly relate to level of achievement, however. The mean SAT mathematics score of 482 for those Asian students at the lowest family income level (under $10,000) exceeded the scores at the highest family levels for several of the underrepresented minorities groups.

Within every racial/ethnic group, higher levels of parental education were associated with higher student scores on the mathematics portion of the SAT. For example, the difference in mean SAT mathematics scores between the group whose parents did not receive a high school diploma and those whose parents held a graduate degree ranged from 120 points for whites to 85 points for blacks.

Racial/ethnic differences in choice of undergraduate major are less dramatic than the differences by sex. Particularly when the social sciences are separated from the natural sciences and engineering, the differences in sex preference become striking: the proportion of males intending to major in natural sciences and engineering was significantly higher in all racial/ethnic groups than the proportion of females intending to major in these subjects. For instance, the proportion of males intending to major in natural science/engineering ranged from 28 percent for American Indian and Puerto Rican males to 37 percent for Asian males. For females, however, the proportion intending to study natural science/engineering was much lower, ranging from 12 percent for Mexican Americans to 16 percent for Asians.

Undergraduate Education

Two-Year Institutions

Two-year institutions have been particularly important in providing access to higher education for traditionally underrepresented groups of students. Two-year colleges enroll 46 percent of the students entering higher education as first-year students; they enroll 50 percent of students from underrepresented minority groups entering college. Although the number of students enrolled full time at 2-year institutions rose by 20 percent from 1980 to 1993, the number of students from underrepresented minority groups enrolled as full-time students increased 39 percent.

Four-Year Institutions

Enrollment of minorities in 4-year institutions has increased at the same time that enrollment of white students leveled off or decreased. Full-time enrollment of underrepresented minorities increased 37 percent between 1980 and 1993 whereas white enrollment increased 1 percent. Among first-year students at 4-year institutions, enrollment of underrepresented minorities increased 18 percent between 1980 and 1993; enrollment of whites decreased 16 percent in that time.

Attrition From Higher Education

Attrition from higher education is greater for minority students. Although underrepresented minorities are 21 percent of first-time first-year undergraduate enrollment, they are only 12 percent of bachelor's degree recipients.[3] Comparison of enrollment profiles for cohorts enrolled in the lower division in 1991 and the upper division[4] in 1993 shows differential declines in the size of cohorts enrolled from different racial/ethnic groups. Comparing across this 2-year period, the losses in numbers of full-time students enrolled were approximately 36 percent of blacks, 22 percent of Hispanics, and 12 percent of American Indians, compared with 8 percent of whites.

Bachelor's Degrees

Underrepresented minorities—blacks, Hispanics, and American Indians—are as likely to earn bachelor's degrees in science and engineering as they are to earn bachelor's degrees in other fields. Blacks earned 7 percent of both science and engineering and non–science-and-engineering degrees, Hispanics earned 5 percent, and American Indians earned 0.5 percent. Asians were more likely to earn degrees in science and engineering than in other fields. They earned 7 percent of bachelor's degrees in science and engineering in 1993 and 3 percent of non–science-and-engineering degrees.

Historically Black Colleges and Universities (HBCUs) continue to play an important role in the undergraduate education of blacks, despite the growing diversity of the Nation's campuses. Thirty percent of the black students receiving bachelor's degrees in science and engineering in 1993 received their degrees from an HBCU.

Graduate Education

Blacks, Hispanics, and American Indians continued to be seriously underrepresented in graduate science and engineering programs. Blacks were 5 percent, Hispanics 4 percent, and American Indians 0.4 percent of the total U.S. citizen enrollment in graduate science and engineering programs. Asians were 7 percent of U.S. citizen enrollment.

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[3] U.S. citizens and permanent residents only.

[4] Placement in a division depends on numbers of credits earned toward the baccalaureate; lower division students generally have fewer than half the number needed to graduate; upper division students, one-half or more.

Master's Degrees

Minorities earned 17 percent of master's degrees in science and engineering in 1993, compared with 13 percent in 1985. Asians increased from 6 percent of master's degrees in 1985 to 8 percent in 1993; blacks and Hispanics both increased from 3 percent in 1985 to 4 percent in 1993.

Doctorates

Minorities who were U.S. citizens earned 11 percent of the total science and engineering doctorates awarded to U.S. citizens in 1993, up from 7 percent of the total in 1983. For all of the underrepresented minorities, the numbers of science and engineering doctorate recipients in 1993 were very small: 374 blacks, 446 Hispanics, and 43 American Indians.

Employment Levels and Trends

With the exception of Asians, minorities are a small proportion of scientists and engineers in the United States. Asians were 9 percent of scientists and engineers in the United States in 1993, although they are only 3 percent of the U.S. population. Blacks, Hispanics, and American Indians as a group are 23 percent of the U.S. population, but only 6 percent of the total science and engineering labor force.[5] Blacks were 3.5 percent, Hispanics were almost 3 percent, and American Indians were 0.02 percent of scientists and engineers.

Underrepresented minorities are an even smaller proportion of doctoral scientists and engineers in the United States than they are of bachelor's or master's scientists and engineers. Asians were 11 percent of doctoral scientists and engineers in the United States in 1993. Blacks were 2 percent, Hispanics were 2 percent, and American Indians were less than half of 1 percent of doctoral scientists and engineers.

In 1993, unemployment rates of doctoral scientists and engineers by race/ethnicity did not differ significantly. The differences in unemployment were small and were consistent with what is expected from chance variations due to sampling.

Within the doctoral science and engineering labor force as a whole, minority scientists and engineers differ in their field of employment.

- Half of black doctoral scientists and engineers, but only 29 percent of all scientists and engineers, are in the social sciences and psychology. Only 11 percent of black doctoral scientists and engineers compared with 21 percent of all doctoral scientists and engineers are in physical sciences, and only 11 percent of black doctoral scientists and engineers, compared with 16 percent of the total, are in engineering.
- Hispanic doctoral scientists and engineers are similar to whites in terms of field.
- Thirty-seven percent of Asians are in engineering, compared with 16 percent of all doctoral scientists and engineers, and only 10 percent of Asians are social scientists, including psychologists, compared with 29 percent of all doctoral scientists and engineers. U.S.-born[6] Asians are similar to whites in terms of field. Non-U.S.-born Asians, on the other hand, as well as non-U.S.-born scientists and engineers in general, are disproportionately likely to be engineers.

Racial/ethnic groups differ in their academic employment characteristics. The types of institutions in which they teach differ; they differ in employment status, in highest degree, in research activities, in rank, and in tenure.

- Asian faculty are far less likely than other groups to be employed in 2-year colleges or to have a master's as their highest degree. They are more likely than others to be engaged in funded research, to be principal or co-principal investigators, and to have publications within the last 2 years—at all ages and within research universities.
- Black faculty are less likely than other groups to be employed in research institutions and are more likely to be employed in comprehensive institutions, liberal arts schools, and 2-year colleges. Black faculty have fewer publications in the previous 2 years than white scientists and engineers—at all ages and in all types of schools. Black faculty are also less likely than other groups to be engaged in funded research or to be a principal investigator or co-principal investigator.
- Hispanic faculty are less likely than other groups to be employed in research institutions and are more likely to be employed in 2-year colleges.
- Among full-time ranked science and engineering faculty, Asians, blacks, and Hispanics are less likely than whites to be full professors. Forty-one percent of Asians, 33 percent of blacks, and 45 percent of Hispanics, compared with 49 percent of whites, are full professors. When age differences are accounted for, Asian and Hispanic faculty are

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[5] The science and engineering field in which blacks, Hispanics, and American Indians earn their degrees has a lot to do with participation in the science and engineering labor force. Blacks, Hispanics, and American Indians are disproportionately likely to earn degrees in the social sciences and to be employed in social science practice, e.g., social worker, clinical psychologist, rather than in social sciences per se.

[6] The term "U.S.-born" refers to those born in the United States. The term "non-U.S.-born" refers to those born outside of the United States.

as likely or more likely than white faculty to be full professors, but black faculty are still less likely than other faculty to be full professors. Among ranked faculty who received doctorates 13 or more years previously, only 58 percent of black faculty compared to 70 percent of white faculty were full professors.

- Black, Hispanic, and Asian faculty are also less likely than white faculty to be tenured. Fifty-four percent of black faculty, 52 percent of Hispanic faculty, and 57 percent of Asian faculty compared with 64 percent of white faculty are tenured.

Black, Hispanic, and Asian scientists and engineers differ little from white scientists and engineers in their primary work activity. The one exception is that among doctoral scientists and engineers, Asians are much more likely than other groups to be engaged in research and development.

The median starting salaries of new bachelor's and master's science and engineering graduates by race/ethnicity are not dramatically different. Racial/ethnic status does not appear to have much effect on salary within the very "elite" population of full-time employed individuals with doctoral science and engineering degrees when one compares groups with similar characteristics on relevant variables expected to affect salary.

Persons With Disabilities

Elementary/Secondary Education

The incidence of elementary/secondary students with disabilities is increasing. Approximately 6 percent of the population of children from birth through age 21 in the United States were in federally supported special education programs in 1992–1993, compared with 4.5 percent in 1976–1977.

More than half of the children ages 6 through 21 with disabilities had specific learning disabilities, and another one-fifth had speech or language impairments. Students with these disabilities were most likely to be either in a regular class environment or in a resource room. Students with other, less prevalent disabilities, such as mental retardation and autism, were more likely to be taught in separate classes or separate schools. Those with speech or language impairments, as well as those with visual impairments, were most likely to spend more than half of their class time in regular education academic classes.

Science and Mathematics Education

Students with physical disabilities make up 4 to 6 percent of the science students and 2 to 6 percent of the mathematics students in grades 1 through 12. Students with mental disabilities make up 2 to 9 percent of the science students and 1 to 5 percent of the mathematics students in grades 1 through 12. Students with mental disabilities are more likely to be included in regular science instruction than in mathematics instruction.

The fraction of students with learning disabilities is much smaller in high school than in the earlier grades. Slightly more than half of the science and mathematics classes in grades 1–4, but only 31 percent of the science classes and 24 percent of the mathematics classes in grades 9–12, have students with learning disabilities. The fraction of students with physical and mental disabilities is much smaller and varies less by grade. Four percent of science classes and 6 percent of mathematics classes in grades 1–4 have at least one student with a physical disability, compared with 5 percent of science classes and 2 percent of mathematics classes in grades 9–12.

Transition to Higher Education

Four percent of high school seniors in 1994 reported a disabling condition; they tended to have lower mean scores on the SAT than did seniors who reported having no disabilities. In mathematics, the average SAT score for students with disabilities was 436, compared with 483 for other students.

Undergraduate Education

Choice of Field

Students with disabilities are as likely to choose science and engineering majors as they are to choose other majors. Students with disabilities constituted 9 percent of first-year students with planned majors in science and engineering and also 9 percent of those planning majors in non–science-and-engineering fields. Students with disabilities constituted a higher proportion of planned majors in physical sciences (10 percent) and social sciences (10 percent) than they did in engineering (8 percent).

Doctorates

The number of science and engineering doctorates earned by people who reported that they had disabilities was 329 in 1993, barely 1 percent of the total science and engineering doctoral degrees awarded.

Earning a doctorate generally takes longer for students with disabilities than for those without. Almost half (47 percent) of 1993 doctorate recipients with disabilities spent more than 10 years completing their doctorates; only a third (34 percent) of all 1993 doctorate recipients took this long.

Employment Levels and Trends

About 20 percent of the population have some form of disability; about 10 percent have a severe disability.[7] Persons with disabilities were 13 percent of all employed persons in 1991 and were 5 percent of the 1993 science and engineering labor force.

The proportion of scientists and engineers with disabilities increases with age. More than half became disabled at age 35 or later. Only 7 percent had been disabled since birth, and only 25 percent had been disabled before the age of 20.

Unlike women and minorities, persons with disabilities are not particularly concentrated in certain fields.

Recent bachelor's science and engineering graduates with disabilities are somewhat less likely than those without disabilities to enroll either full time or part time in graduate school. Twenty-six percent of 1992 bachelor's science and engineering graduates with disabilities were full-time or part-time graduate students in 1993, compared with 31 percent of comparable graduates without disabilities.

The unemployment rates of recent bachelor's science and engineering graduates with and without disabilities are similar. The unemployment rate for 1992 bachelor's science and engineering graduates with disabilities was 4.7 percent compared with 4.5 percent for those without disabilities.

The labor force participation rates of doctoral scientists and engineers with and without disabilities are quite different. Almost one-quarter of doctoral scientists and engineers with disabilities are out of the labor force, compared with only 7 percent of those without disabilities.

Among those in the labor force, persons with disabilities are more likely than those without disabilities to be unemployed and to be employed part time. The unemployment rate for doctoral scientists and engineers with disabilities was 2.4 percent compared with 1.6 percent for those without disabilities. The percentage of doctoral scientists and engineers in the labor force who were employed part time in 1993 was 11 percent for those with disabilities and 6 percent for those without disabilities.

Doctoral scientists and engineers who are employed in universities and 4-year colleges and who have disabilities are more likely than those without disabilities to be full professors and to be tenured. Because incidence of disability increases with age, scientists and engineers with disabilities tend to be older and to have more years of professional work experience than those without disabilities. Among pre-1985 graduates, the differences in rank and tenure status between persons with disabilities and persons without disabilities are narrower.

The type of work that bachelor's-level and master's-level scientists and engineers with disabilities do is not greatly different from the type of work done by those without disabilities. The primary work activity of 27 percent of bachelor's scientists and engineers with disabilities is computer applications, compared with 29 percent of those without disabilities. Design of equipment is the primary work activity of 15 percent of bachelor's scientists and engineers both with and without disabilities. Ten percent of bachelor's scientists and engineers with disabilities and 11 percent of those without disabilities are in management and administration.

Within industry, doctoral scientists and engineers with disabilities are more likely than those without disabilities to be in management. Again, this is a function of age. Among doctoral scientists and engineers age 45 and older and employed in business or industry, 32 percent of both those with disabilities and those without disabilities are in management.

Disability status appears to have a slight effect on salary among those full-time employed individuals with doctoral science and engineering degrees when one compares groups with similar characteristics on relevant variables expected to affect salary. Those with disabilities average salaries approximately $1,000 a year less than those without disabilities.

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[7] Estimates of the proportion of the population with disabilities vary due to differing definitions of "disability." See the appendix A Technical Notes for a discussion of the limitations of estimates of the size of this group. The source of these estimates is the U.S. Department of Commerce, Bureau of the Census. 1993. *Americans With Disabilities: 1991–92*: Data from the Survey of Income and Program Participation, P70-33.

CHAPTER 1

INTRODUCTION

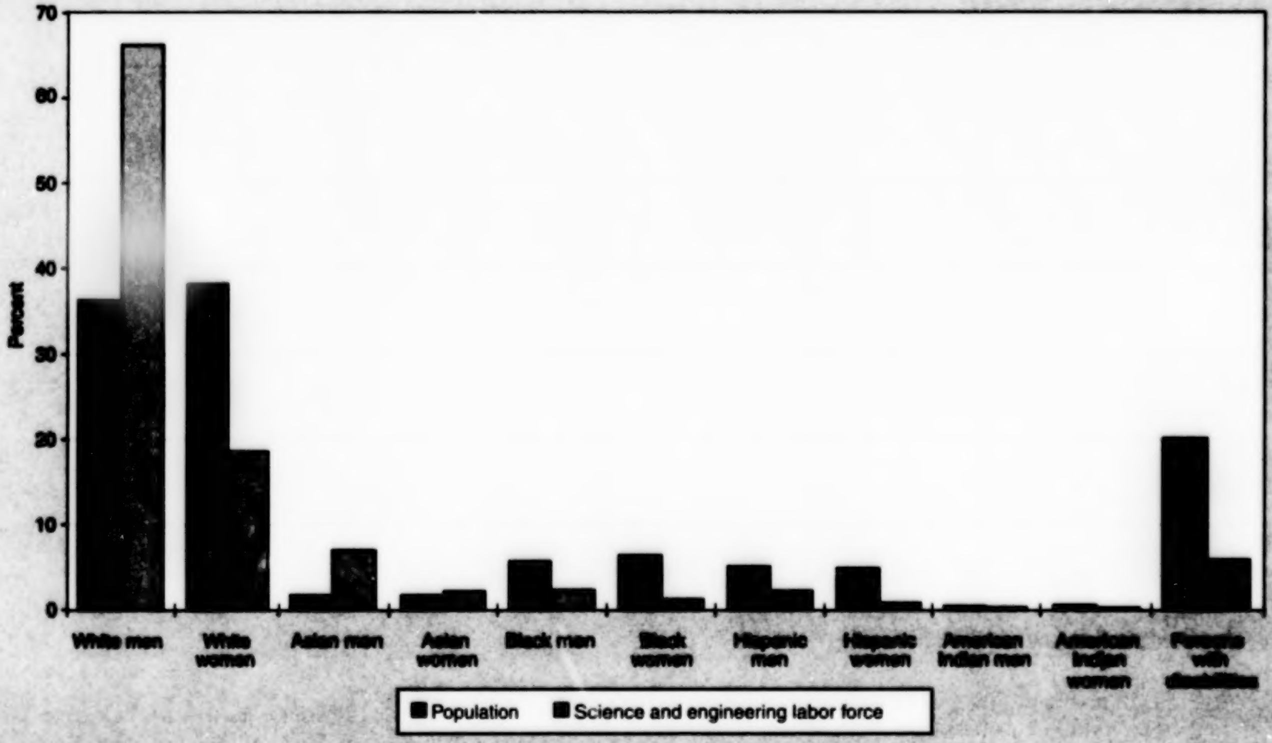
Representation in Science and Engineering

The Science and Engineering Equal Opportunities Act of 1980 declares that

> it is the policy of the United States to encourage men and women, equally, of all ethnic, racial, and economic backgrounds to acquire skills in science, engineering and mathematics, to have equal opportunity in education, training, and employment in scientific and engineering fields, and thereby to promote scientific and engineering literacy and the full use of the human resources of the Nation in science and engineering.[1]

Women, minorities, and persons with disabilities[2] are underrepresented in scientific and engineering occupations. (See figure 1-1.) Some progress has been made over the last several decades, especially in the number of degrees awarded to women, but there is still room for improvement. Women and underrepresented minorities—blacks, Hispanics, and American Indians—take fewer high-level mathematics and science courses in high school; earn fewer bachelor's, master's, and doctoral degrees in science and engineering; and are less likely to be employed in science and engineering than are white males.

Figure 1-1.
Percentage of the U.S. population and the science and engineering labor force, by sex, race/ethnicity, and disability status: 1993



See appendix tables 1-2 and 1-6.

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[1] Science and Engineering Equal Opportunities Act, Section 32(b), Part B of P.L. 96-516, 94 Stat. 3010, as amended by P.L. 99-159.

[2] See appendix table 1-1 for federal definitions of disability categories.

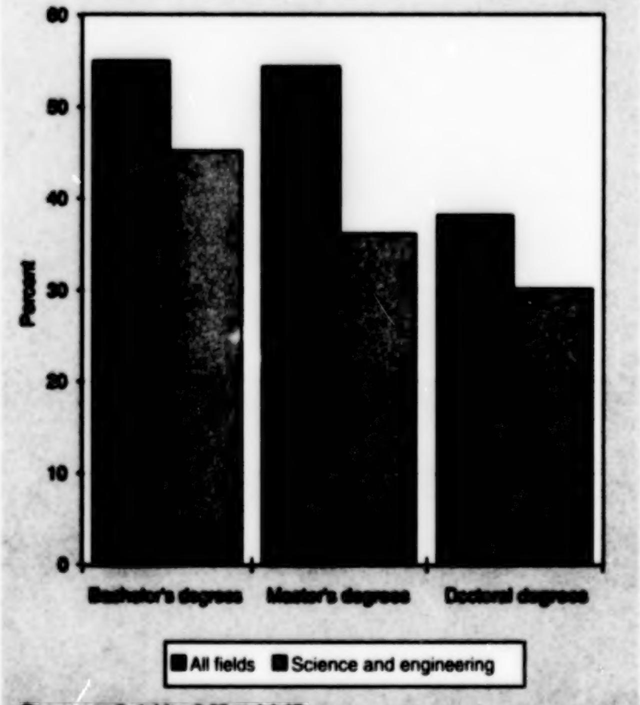
Women

Women constitute 51 percent of the U.S. population,[3] and 46 percent of the U.S. labor force (see appendix tables 1-2 and 1-4), but only 22 percent of scientists and engineers in the labor force. (See text table 1-1.) Women, particularly white women, are approaching parity among science and engineering bachelor's degree recipients. In 1993, 45 percent of bachelor's degree recipients in science and engineering were women, up from 39 percent in 1983. (See appendix table 3-25.) Women, though, are less likely to choose science and engineering than they are to choose other fields. Women were 58 percent of bachelor's degree recipients in non-science-and-engineering fields in 1993, compared with 45 percent of bachelor's degree recipients in science and engineering. (See figure 1-2.) Within science and engineering, women are still concentrated in a few fields—predominantly the social sciences. Women earned more than half of the bachelor's degrees in psychology and social sciences, but only about one-third of the bachelor's degrees in mathematics and physical sciences, and 16 percent of bachelor's degrees in engineering.

Women earn a smaller proportion of master's and doctoral degrees than they do of bachelor's degrees. Far fewer women than men are enrolled in graduate science and engineering education or earn doctoral degrees in science and engineering. Women were 36 percent of graduate enrollment in science and engineering in 1993 and were 30 percent of science and engineering doctorate recipients. (See appendix tables 4-8 and 4-24.)

Because of their more recent entry into science and engineering as well as a greater tendency than men to be out of the labor force and to be employed outside of science and engineering, women are only 22 percent of the science and engineering labor force. Also because of their more recent entry into science and engineering, far fewer women than men attain the rank of full professor in academia or attain management positions in industry.

Figure 1-2.
Percentage of degrees in science and engineering and in all fields to women, by level of degree: 1993

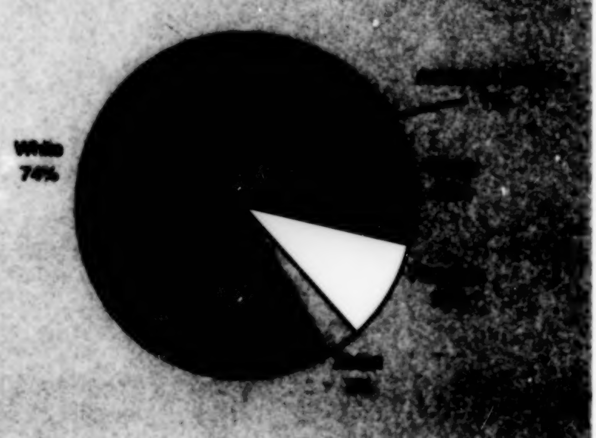


See appendix tables 3-25 and 4-19.

Minorities[4]

Blacks, Hispanics, and American Indians have historically been underrepresented in science and engineering. Asians, on the other hand, are overrepresented in science and engineering. Asians were 3 percent of the U.S. population, but 5 percent of U.S. citizen doctorate recipients in 1993. Underrepresented minorities as a whole were about 23 percent of the U.S. population. Blacks constituted about 12 percent of the U.S. population, Hispanics about 10 percent, and American Indians about 1 percent. (See figure 1-3.) Although they are as likely to choose science and engineering fields as other

Figure 1-3.
Percentage of the U.S. population, by [illegible]
July 1993



See appendix table 1-2.

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[3] As of July 1993. Source: U.S. Bureau of the Census, PPL-8, *U.S. Population Estimates, by Age, Sex, Race, and Hispanic Origin, 1990 to 1993.* Includes persons residing in the 50 States and the District of Columbia.

[4] In accordance with Office of Management and Budget guidelines, the racial/ethnic groups described in this report will be identified as white, non-Hispanic; black, non-Hispanic; Hispanic; Asian or Pacific Islander; and American Indian or Alaskan Native. In text and figure references, these groups will be referred to as white, black, Hispanic, Asian, and American Indian. In instances where data collection permits, subgroups of the Hispanic population will be identified by subgroup name.

Text table 1-1.
Selected characteristics by sex, race/ethnicity, and disability status: 1993
Dash indicates not available.

Sex and race ethnicity	Resident population of U.S.[a]	High school graduates[b]	BA/BS degrees in all fields[c]	BA/BS degrees in S&E[c]	New BA/BS entrants to S&E employment[d]	S&E graduate school enrollment[c]	PhD degrees in S&E[c]	S&E labor force[e]
All races	100%	100%	100%	100%	100%	100%	100%	100%
Men	48.8	48.3	45.1	54.7	56.7	64.0	69.9	77.6
Women	51.2	51.7	54.9	45.3	43.3	36.0	30.1	22.4
White, not Hispanic	74.4	81.9	83.0	81.2	81.5	82.1	83.8	84.6
Men	36.3	39.7	38.1	46.5	47.5	—	53.2	66.2
Women	38.1	42.2	44.9	34.6	34.0	—	30.6	18.4
Black, not Hispanic	11.9	13.3	6.8	6.7	7.5	5.5	2.9	3.5
Men	5.6	6.1	2.5	2.9	2.8	—	1.6	2.3
Women	6.3	7.2	4.3	3.8	4.7	—	1.3	1.2
Hispanic	9.8	8.5	5.1	5.0	3.8	4.3	3.3	2.8
Men	5.0	4.0	2.1	2.5	2.2	—	1.9	2.1
Women	4.8	4.5	3.0	2.5	1.6	—	1.4	0.7
American Indian	0.7	—	0.5	0.5	0.4	0.4	0.3	0.2
Men	0.3	—	0.2	0.3	0.2	—	0.2	0.2
Women	0.4	—	0.3	0.2	0.2	—	0.1	0.1
Asian	3.2	—	4.5	6.6	6.8	7.8	9.8	8.9
Men	1.6	—	2.2	3.9	4.0	—	6.6	6.9
Women	1.6	—	2.3	2.7	2.8	—	3.2	2.1
Persons with disabilities[f]	20.0	—	—	—	11.1	—	1.3	5.8
Persons without disabilities	80.0	—	—	—	88.9	—	98.7	94.2

[a] Source: U.S. Bureau of the Census, Population Division, Release PPL-8, *U.S. Population Estimates, by Age, Sex, Race, and Hispanic Origin, 1990 to 1993.*

[b] Source: Bruno and Adams, U.S. Bureau of the Census, Current Population Reports P20-479, October 1994. Includes persons 18–24 only. Hispanics are included in both the white and black population groups. See appendix table 1-3.

[c] Figures by race/ethnicity are for U.S. citizens and permanent residents only. Sources: National Science Foundation, *Science and Engineering Degrees: 1966–93, Selected Data on Graduate Students and Postdoctorates in Science and Engineering, Fall 1993,* and *Selected Data on Science and Engineering Doctorate Awards, 1993.*

[d] Source: National Science Foundation, National Survey of Recent College Graduates, 1993. Excludes full-time graduate students.

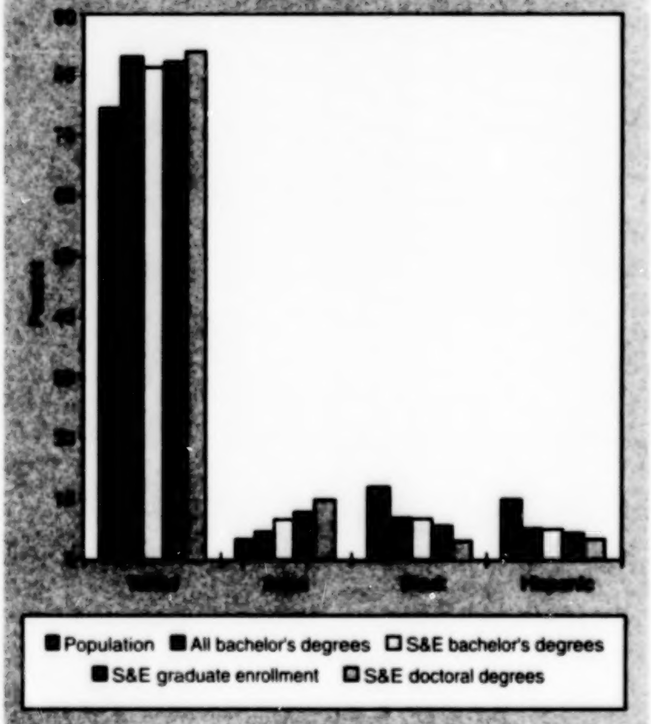
[e] Source: National Science Foundation, National Survey of College Graduates, 1993. See appendix table 1-5.

[f] Source: U.S. Department of Commerce, Bureau of the Census. 1993. *Americans With Disabilities: 1991–92: Data From the Survey of Income and Program Participation,* P70-33.

fields, blacks, Hispanics, and American Indians are less likely than whites to earn bachelor's degrees. (See figure 1-4.) As a group, they are only 12 percent of bachelor's degree recipients in science and engineering, as they are of bachelor's degree recipients in all fields. Steady progress has been made in these groups' share of science and engineering degrees. In 1985, blacks were 5.2 percent of bachelor's degree recipients in science and engineering, Hispanics were 3.7 percent, and American Indians were 0.4 percent. By 1993, the fraction of science and engineering bachelor's degrees earned by blacks increased to 6.7 percent, by Hispanics to 5.0 percent, and by American Indians to 0.5 percent.[5] (See figure 1-5.) Blacks, Hispanics, and American Indians are more likely to earn degrees in the social sciences than in the natural sciences or engineering. More than half of the bachelor's degrees earned by members of these groups were in social sciences. (See appendix table 3-28 and figure 1-6.)

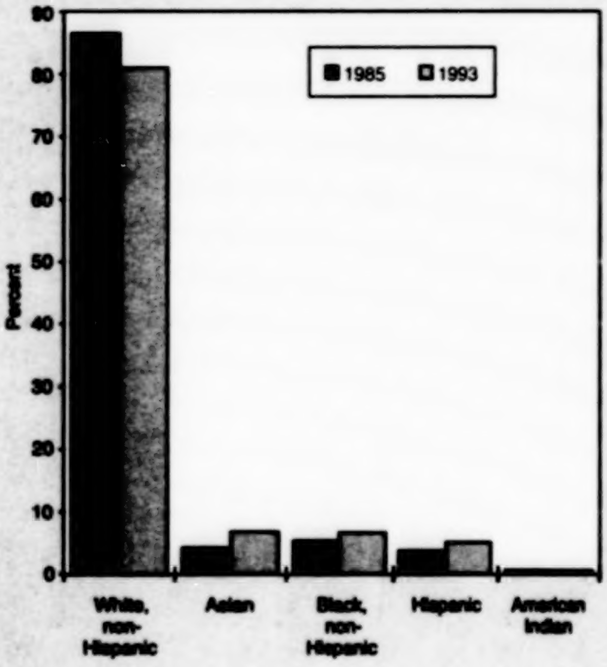
Blacks, Hispanics, and American Indians, who constitute 6 percent of the total science and engineering labor force, are disproportionately likely to earn degrees in the social sciences and to be employed as social science practitioners, for example, as social workers or clinical psychologists, rather than in social sciences per se.

Figure 1-4.
U.S. population, undergraduate and graduate education, by race/ethnicity: 1993



See text table 1-1.

Figure 1-5.
Percentage of bachelor's degrees in science and engineering to U.S. citizens and permanent residents, by race/ethnicity: 1985 and 1993



See appendix table 3-27.

Persons With Disabilities

Persons with disabilities are also underrepresented in science and engineering. About 20 percent of the population have some form of disability; about 10 percent have a severe disability.[6] Data on participation of persons with disabilities are less available than data on other groups (for example, no data on bachelor's degrees in science and engineering by disability status are available). The data that do exist, though, point to a small proportion of persons with disabilities in science and engineering education and employment. In 1993, persons with disabilities were only 6 percent of undergraduate enrollment, 4 percent of graduate enrollment, 1.3 percent of science and engineering doctorate recipients, and 6 percent of scientists and engineers in the labor force.[7] (See figure 1-7.)

Factors influencing participation by women, minorities, and persons with disabilities in science and engi-

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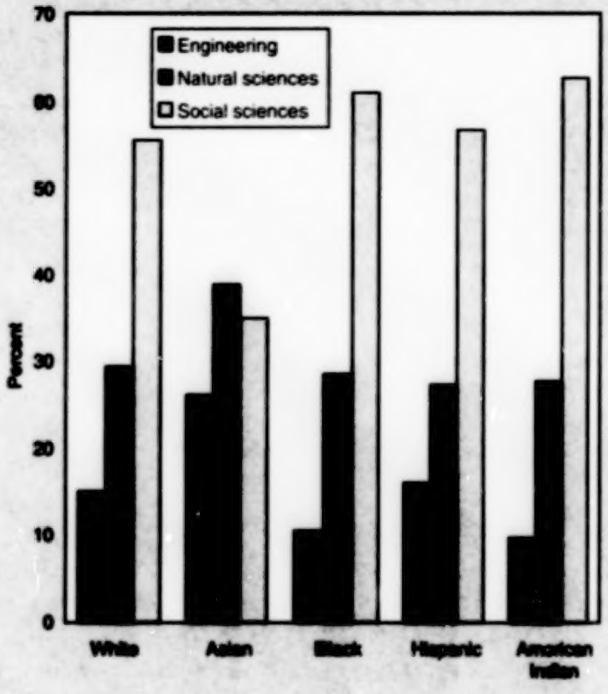
[5] U.S. citizens and permanent residents only.

[6] Estimates of the proportion of the population with disabilities vary because of differing definitions of "disability." See appendix A Technical Notes for a discussion of the limitations of estimates of the size of this group. The source of these estimates is the U.S. Department of Commerce, Bureau of the Census. 1993. *Americans With Disabilities: 1991–92: Data From the Survey of Income and Program Participation*, P70-33.

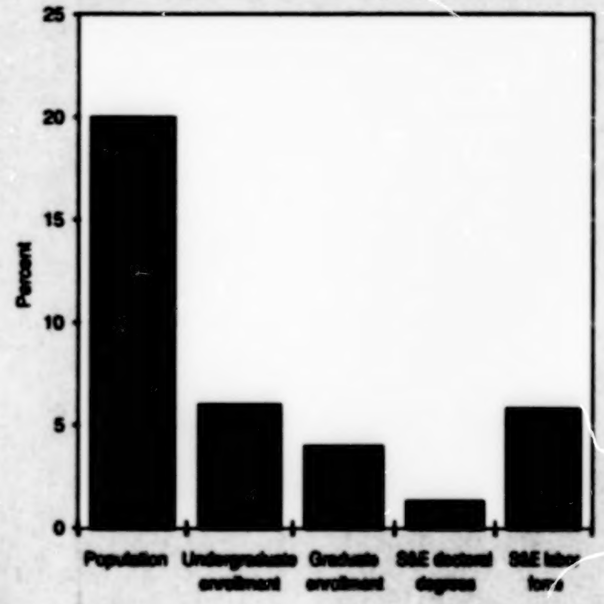
[7] The incidence of disability increases with age. More than half of doctoral scientists and engineers who indicate they have a disability became disabled at age 35 or older. See appendix table 5-43.

Figure 1-6.
Percentage of bachelor's degrees in science and engineering, by broad field and race/ethnicity: 1993 (U.S. citizens and permanent residents only)



See appendix table 3-27.

Figure 1-7.
Percentage of persons with disabilities in the U.S. population in undergraduate and graduate enrollment, among science and engineering doctoral degree recipients, and in the science and engineering labor force: 1993



See text table 1-1.

neering are varied and complex. They include, among others, differences in access to educational resources, differences in economic status, differences in interest (choice), cultural barriers, and lack of encouragement.[8]

Scope of This Report

The National Science Foundation (NSF) is mandated by Congress to provide biennial reports on the status of women and minorities in science and engineering. The primary purpose of this report is to monitor trends in participation at various levels. This report documents the progress that has been made by women, minorities, and persons with disabilities in science and engineering education and employment and highlights the areas in which further progress can be made. This report is the eighth in a series of reports on this subject. Like its predecessors, it examines the participation of women, minorities, and persons with disabilities in science and engineering education and in scientific and engineering occupations, including employment, salaries, and promotional opportunities.

Statistical data are presented on representation in science and engineering education at the precollege, undergraduate, and graduate levels, and on representation in science and engineering employment.

Current data and historical trends from a number of NSF surveys are reported, and also, where appropriate, findings from externally conducted research are cited. A chronological sequence of education then workforce participation is followed. This report documents the progress that has been made in recent years and examines some of the factors that continue to hinder further participation.

Organization of This Report

Chapter 2 focuses on precollege mathematics and science education, including science and mathematics achievement, course taking, attitudes toward science and engineering, and school differences in curricula, resources, activities, and teacher qualifications.

Chapter 3 examines undergraduate education as preparation both for careers and for graduate education. This chapter presents data on trends in enrollments and degrees in 2- and 4-year colleges and universities, characteristics of first-year students, and financial support. It also discusses attrition and characteristics of undergraduate environments that are conducive to retention of women, minorities, and students with disabilities.

Chapter 4 addresses graduate enrollment, degrees, and financial support. It presents data on trends in enrollments and degrees, primary source of support in graduate school, time to completion of PhD, and postdoctoral fellowships.

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[8] See, for example, Oakes, Jeannie. 1990. *Lost Talent: The Underparticipation of Women, Minorities, and Disabled Persons in Science*. Santa Monica, CA: The RAND Corporation.

Chapter 5 examines employment patterns including unemployment, underemployment, full- and part-time employment, and employment by field and sector. It also examines career patterns and attrition out of science and engineering, and focuses separately on academic and nonacademic employment.

Data Sources

Data for this report come from a number of sources. The primary sources of information are surveys conducted by NSF's Division of Science Resources Studies. Other sources include surveys conducted by the Department of Education's National Center for Education Statistics (NCES), by the Educational Testing Service, and by the Higher Education Research Institute.

Data on bachelor's and master's degrees come from the Integrated Postsecondary Education Data Systems (IPEDS) Completions Survey, which is part of an integrated system of surveys conducted by the National Center for Education Statistics. This survey provides data on the number and types of degrees awarded by U.S. postsecondary institutions and data on the characteristics of degree recipients.

Data on graduate enrollments come primarily from NSF's Graduate Students and Postdoctorates in Science and Engineering (GSESP) Survey. This survey provides data on the number and characteristics of graduate science and engineering students enrolled in U.S. institutions, differences in enrollment patterns, and differences in financial support patterns.

Data on doctoral degrees come primarily from the Survey of Earned Doctorates (SED), which is conducted by the National Research Council for the National Science Foundation, the National Institutes of Health, the National Endowment for the Humanities, the U.S. Department of Education, and the U.S. Department of Agriculture. This survey annually provides data on the number and characteristics of individuals receiving research doctorate degrees from U.S. institutions.

Data on employment come primarily from three surveys that will form an integrated system of NSF surveys called the Scientist and Engineer Statistics Data System (SESTAT), which produces national estimates of the entire science and engineering workforce.[9] The Survey of Doctorate Recipients provides demographic and employment information on individuals with doctoral degrees in science and engineering. This survey is a longitudinal survey of a sample of individuals under the age of 76 who received a research doctorate in science or engineering from a U.S. institution and who were living in the United States. The National Survey of Recent College Graduates provides employment and demographic data on individuals who recently obtained a bachelor's or master's degree in a science or engineering field. The National Survey of College Graduates provides data on the number and characteristics of individuals with training and/or employment in science and engineering in the United States.

Other large-scale sources of data used in this report include the NCES National Postsecondary Student Aid Study (NPSAS), the NCES Faculty Survey, and the NCES High School and Beyond Survey.

The Technical Notes in appendix A present information on the underlying concepts, data collection techniques, reporting procedures, and statistical reliability of the primary data sources used in this report.

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[9] Scholars and policy analysts may access the SESTAT system through a variety of means, including access through the World Wide Web and restricted use data files. Individuals interested in obtaining more information about accessing the system should contact the Division of Science Resources Studies' Science and Engineering Personnel Program (PER) at (703) 306-1776.

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CHAPTER 2

PRECOLLEGE EDUCATION

Differences in science and mathematics achievement by sex and by race/ethnicity appear as early as elementary school and widen in secondary school. The lag in achievement by women and minority students may hinder their participation in science and engineering higher education and careers because they have less of a foundation for such pursuits. Many factors contribute to differences in achievement, including course taking, family background, and school characteristics such as tracking, teachers' judgments about ability, number and quality of science and mathematics courses offered, access to qualified teachers, access to resources, and curricula emphases. This chapter examines precollege science and mathematics course taking, achievement, factors influencing achievement, and the transition to higher education.

Mathematics Course Taking

Women

The number of courses taken in mathematics and science is an important indicator of preparation for undergraduate majors in science and engineering as well as of general scientific literacy. Female students are similar to males in mathematics course taking at all levels, according to the 1992 National Education Longitudinal Study Transcripts. More than half of both male and female high school graduates in 1992 had taken algebra I, algebra II, and geometry, but far fewer had taken trigonometry and calculus in high school. Nevertheless, the same percentages of male and female students had taken these advanced courses: 21 percent of both had taken trigonometry and 10 percent of both had taken calculus. Similar percentages of male and female students had taken advanced placement calculus: 6 percent of males and 5 percent of females. (See appendix table 2-1.)

Minorities

Racial/ethnic groups differ greatly in mathematics course taking. Black and Hispanic high school graduates in 1992 were far less likely than white and Asian students to have taken advanced mathematics courses and far more likely to have taken remedial mathematics courses. Thirty-one percent of blacks, 24 percent of Hispanics, and 35 percent of American Indians, compared with about 15 percent of whites and Asians, had taken remedial mathematics in high school. Although about 60 percent of both white and Asian students had taken algebra II, less than half of blacks, Hispanics, and American Indians had taken this course. Asians were most likely of any racial/ethnic group to have taken advanced mathematics courses. Almost one-third of Asians had taken trigonometry, and one-fifth had taken calculus. By contrast, 22 percent of whites, 13 percent of blacks, 15 percent of Hispanics, and 10 percent of American Indians had taken trigonometry, and far smaller percentages took precalculus or calculus. (See appendix table 2-1.)

Although substantial differences in course taking by racial/ethnic groups remain, the percentages of black, Hispanic, and American Indian students taking many basic and advanced mathematics courses doubled between 1982 and 1992. For example, 30 percent of black high school graduates in 1982 had taken geometry, and 1 percent had taken calculus. By 1992, this had increased to 60 percent and 7 percent respectively. (See appendix table 2-1.)

Science Course Taking

Women

Male and female high school students did not differ greatly in science course taking in 1992, except in physics. Similar percentages of both male and female high school graduates had taken biology and chemistry: 92 percent of males and 94 percent of females had taken biology, and 54 percent of males and 57 percent of females had taken chemistry. Male students, however, were more likely than females to have taken physics: 28 percent of males and 21 percent of females had taken physics. Male students were also more likely than females to have taken advanced placement physics. Female students have made gains over the last several years, however: in 1982, only 9 percent of women had taken physics in high school. (See appendix table 2-2.)

A study undertaken by the American Institute of Physics indicates female students are increasing their share of physics enrollment. Women constituted 43 percent of high school physics enrollment in 1993, up from 39 percent in 1987. They were a smaller fraction, though, of physics students in the more advanced classes. For example, female students were 46 percent of students in the physics for nonscience students classes but only 27 percent of the calculus-based advanced placement course enrollment in physics (Neuschatz and Alpert 1995).

Minorities

Racial/ethnic differences in science course taking are pronounced. Black and Hispanic students are far less likely than white students to have taken advanced science courses. Although black and Hispanic high school graduates are about equally likely as white and Asian students to have taken biology, they are much less likely than whites and Asians to have taken chemistry or physics. Only 46 percent of black, 43 percent of Hispanic, and 33 percent of American Indian high school graduates had taken chemistry compared with 58 percent of white and 67 percent of Asian high school graduates. (See appendix table 2-2.) Although 42 percent of Asian and 26 percent of white students had taken physics, less than 20 percent of black, Hispanic, and American Indian students had taken physics in high school.

Although the gap in science course taking between whites and underrepresented minorities remains, blacks, Hispanics, and American Indians are taking more science classes than they took in the past. The percentage of blacks and Hispanics taking chemistry and physics doubled between 1982 and 1992. In 1982, 23 percent of black and 17 percent of Hispanic high school graduates had taken chemistry. By 1992, this had increased to 46 percent and 43 percent, respectively. In 1982, approximately 7 percent each of blacks and Hispanics had taken physics; by 1992, 18 percent of blacks and 16 percent of Hispanics had taken physics. (See appendix table 2-2.)

Science and Mathematics Achievement

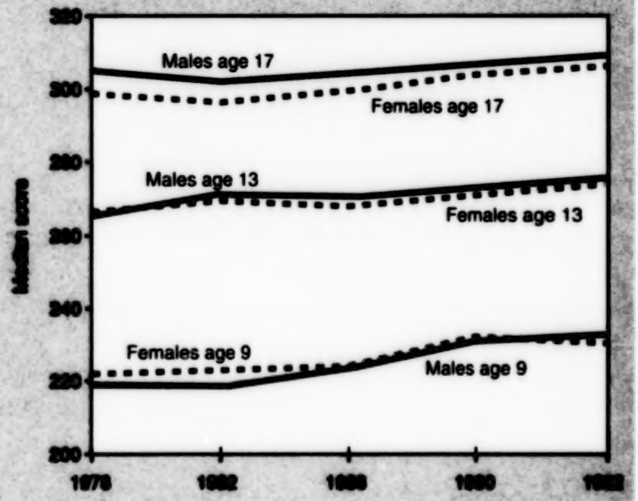
Given the differences in course taking, differences in science and mathematics achievement are not surprising. Trends in science and mathematics achievement since the early 1970s reveal persistent differences by race and sex at ages 9, 13, and 17 despite the narrowing of many gaps.[1]

Women

Male students score slightly higher than female students on the National Assessment of Educational Progress (NAEP) science and mathematics achievement tests at all ages. (See figures 2-1 and 2-2.) At age 17, the gap between males' and females' mathematics and science scores is smaller than in the 1970s, but the narrowing of the gap is not statistically significant.

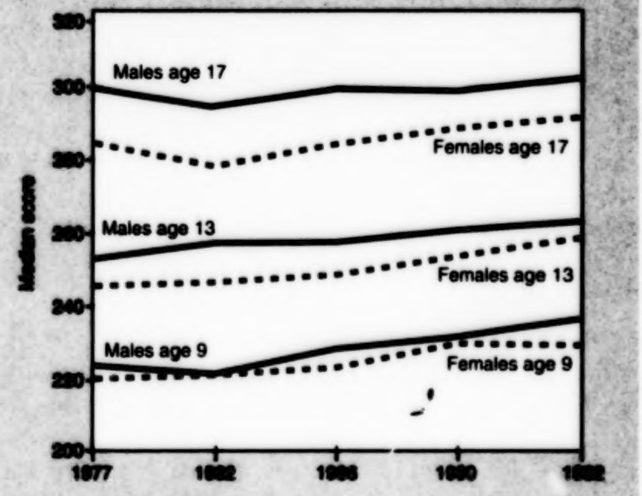
Male and female students have similar mathematics proficiency at ages 9, 13, and 17, although males' average scores are slightly higher. In previous years, female students at age 9 had a slight edge over male students, but in 1992, male scores edged higher than those of females. (See figure 2-1.) Although males showed the most gains at age 9, female students improved most at age 17. The

Figure 2-1.
NAEP mathematics scores at ages 9, 13, and 17, by sex: 1978–1992, selected years



See appendix tables 2-3, 2-4, and 2-5.

Figure 2-2.
NAEP science scores at ages 9, 13, and 17, by sex: 1977–1992, selected years



See appendix tables 2-8, 2-9, and 2-10.

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[1] The National Assessment of Educational Progress (NAEP) has been collecting data on student achievement in science and mathematics (and other fields) since 1969. Conducted by the Educational Testing Service under contract with the National Center for Education Statistics, NAEP assesses the academic achievement of a nationwide sample of students at public and private schools to gauge progress in educational attainment.

result of these increases is a similar percentage of males and females scoring at or above selected anchor points. In 1992, 82 percent of males and 81 percent of females scored at or above 200 at age 9, 78 percent of both sexes scored at or above 250 at age 13, and 60 percent of males and 58 percent of females scored at or above 300 at age 17. (See appendix table 2-6.)

Female students also score lower than male students on the NAEP science assessment at ages 9, 13, and 17. (See figure 2-2.) Although the differences are small (from 1 to 3 percent lower), they are statistically significant and have been persistent since 1970 (U.S. Department of Education 1994). The gap between males' and females' science achievement is greatest at age 17, although female students' scores have increased significantly since 1982. In 1982, 45 percent of male and 30 percent of female 17-year-olds scored at or above 300 on the NAEP science assessment. In 1992, 51 percent of males and 42 percent of females in that age group scored at or above 300: a 6-percentage-point increase for males and a 12-percentage-point increase for females. (See appendix table 2-11.)

Minorities

The differences in mathematics and science achievement by race/ethnicity are much more pronounced than differences by sex, although they have narrowed during the past decade. Mathematics scores improved for white, black, and Hispanic students at ages 9, 13, and 17 between 1978 and 1992. (See figure 2-1.) Gains for black and Hispanic students were higher than those for white students. For example, 13 percent more black 17-year-olds and 18 percent more Hispanic 17-year-olds scored at or above 300 compared with 12 percent more white 17-year-olds. (See appendix table 2-6.)

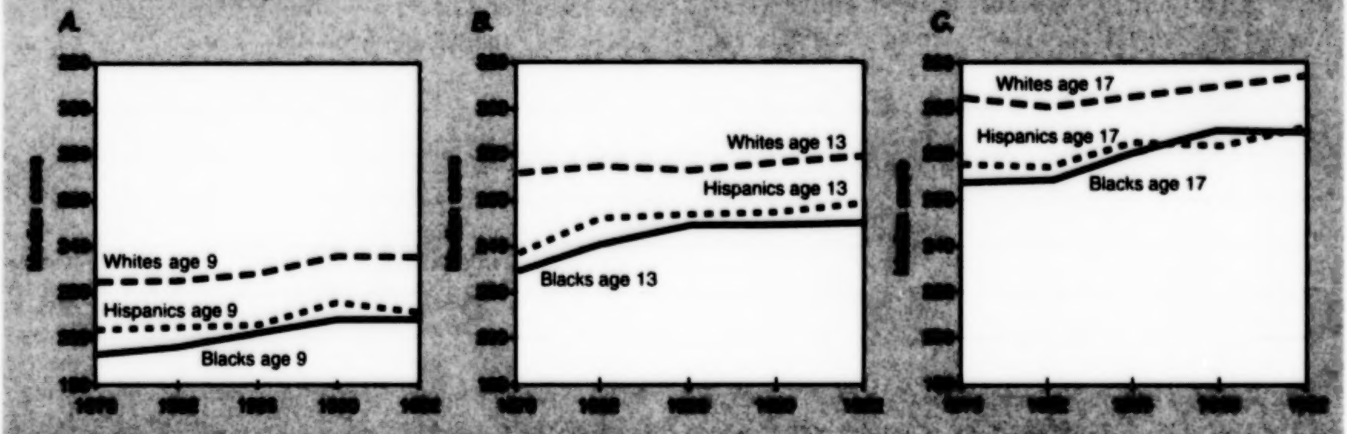
Despite these gains, mathematics scores for black and Hispanic students remain substantially lower than those of white students at all three age levels. (See appendix tables 2-3 to 2-6.) The median scores for black and Hispanic students at all three age levels are lower than the 25th percentile scores for white students. The gap between white and black mathematics scores at ages 9, 13, and 17 narrowed between 1978 and 1992, although it is still substantial. The gap between white and Hispanic mathematics scores narrowed at ages 13 and 17, but has remained constant at age 9. (See figure 2-3.)

As with mathematics scores, differences in science scores persist across racial/ethnic groups. Scores for whites are substantially higher than those for blacks and Hispanics at all age levels, and differences are greatest at age 17. (See figure 2-4.) Science scores increased for students at all three ages between 1982 and 1992, although scores for some groups increased more than others. The gap between black and white and between Hispanic and white science scores narrowed for 9-year-olds between 1982 and 1992. Fifty-one percent of black 9-year-olds scored at or above 200 in 1992, compared with 39 percent in 1982, a 12-percentage-point increase. The percentage of Hispanic 9-year-olds scoring at or above 200 increased from 40 percent in 1982 to 56 percent in 1992, a 15-percentage-point increase. The comparable gain for white 9-year-olds was from 78 percent in 1982 to 86 percent in 1992, a 7-percentage-point increase. (See appendix table 2-11.) No narrowing of the gap was evident for black or Hispanic 13-year-olds or 17-year-olds.

Factors Influencing Achievement

Some of the differences in mathematics and science achievement by race/ethnicity can be explained by family background characteristics and school characteristics

Figure 2-3.
A. NAEP mathematics scores at age 9, by race/ethnicity: 1978–1992, selected years. B. NAEP mathematics scores at age 13, by race/ethnicity: 1978–1992, selected years. C. NAEP mathematics scores at age 17, by race/ethnicity: 1978–1992, selected years.

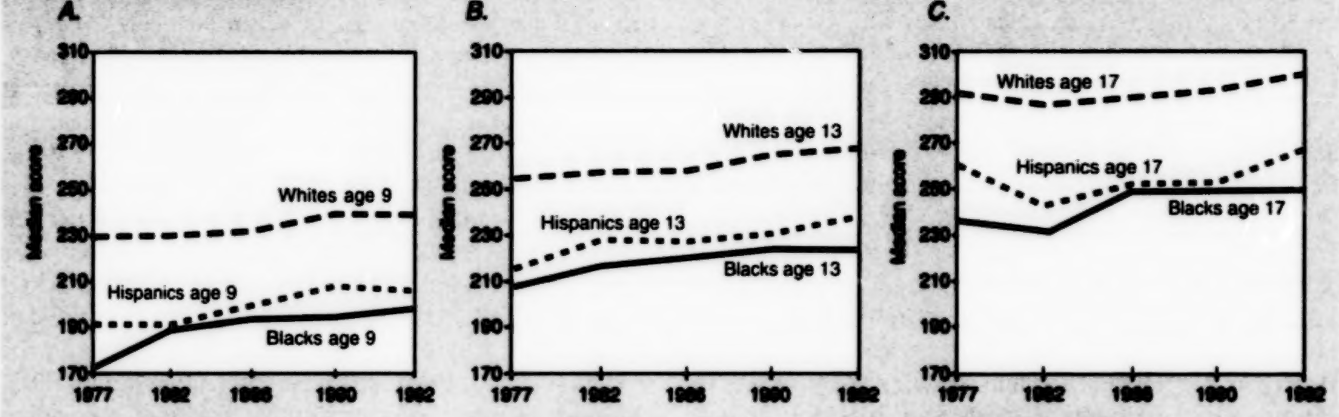


See appendix table 2-3.

See appendix table 2-4.

See appendix table 2-5.

Figure 2-4.
A. NAEP science scores at age 9, by race/ethnicity: 1977–1992, selected years. *B.* NAEP science scores at age 13, by race/ethnicity: 1977–1992, selected years. *C.* NAEP science scores by age 17, by race/ethnicity: 1977–1992, selected years



See appendix table 2-8. See appendix table 2-9. See appendix table 2-10.

other than the role of course taking already cited. Minority students are more likely than white students to come from families in poverty, to have parents with low education levels, and to attend "disadvantaged" schools (Peng et al. 1995).

Family Background

Family background characteristics have a considerable influence on minority participation and achievement in science and mathematics education.

Family Income

Children from poor families have less access to learning materials and educational activities (Oakes 1990a) and are less likely to complete high school. Socioeconomic status (parental occupation, education, and income) accounts for a substantial amount of the differences in mathematics achievement (Ekstrom et al. 1988). Persistence in high school is strongly associated with family income. Students from low-income families are more likely to repeat a grade and to drop out of high school than students from higher income families. One-third of low-income students who repeated a grade were dropouts in 1992. (See appendix table 2-12.)

A larger percentage of minority students than of white students come from families in poverty with less access to learning materials and educational activities (Peng et al. 1995). Black children, in particular, are more likely than other children to live in single-parent families and to live in poverty. Only 34 percent of black children under 18 live with both parents compared with 79 percent of white, non-Hispanic children. (See appendix table 2-13.) Thirty-nine percent of black families with children under 18 are below the poverty level compared with only 12 percent of comparable white, non-Hispanic families.

Parental Education

Parental education is the single most important predictor of participation in mathematics and science (Berryman 1983; Malcom et al. 1985). Those most likely to go to college or to graduate school are those whose parents went to college or to graduate school. The parents serve as role models and mentors in encouraging their children to have high educational aspirations (Oakes 1990a).

Minority students are more likely than white or Asian students to have parents with low educational attainment: 32 percent of Hispanic, 15 percent of black, and 12 percent of American Indian eighth graders, but only 6 percent of white and 8 percent of Asian eighth graders, had parents or guardians who did not finish high school (Pavel et al. 1995, p. 13). Students at all age levels whose parents had less than high school education scored lower in science and mathematics than students whose parents had higher levels of education. Among students ages 9 and 13, however, the science and mathematics scores of students whose parents had less than a high school education improved more since 1978 than those whose parents attended school longer. (See appendix table 2-14.)

Immigrant Status

Mathematics achievement is also related to parental immigrant status. Asian students, regardless of immigrant status, score higher than white students in mathematics at grades 4, 8, and 12. (See appendix table 2-7.) Asian eighth graders whose parents are immigrants (i.e., the children are first- or second-generation immigrants) have higher grades and higher mathematics scores than those whose parents were born in the United States (Kao and Tienda 1995).

Characteristics of Schools

Many factors contribute to unequal participation of minorities in science and mathematics education, including tracking, judgments about ability, number and quality of science and mathematics courses offered, access to qualified teachers, access to resources, and curricula emphases. Schools, particularly secondary schools, in urban areas with a high proportion of economically disadvantaged or minority students offered less access to science and mathematics education (Oakes 1990b).

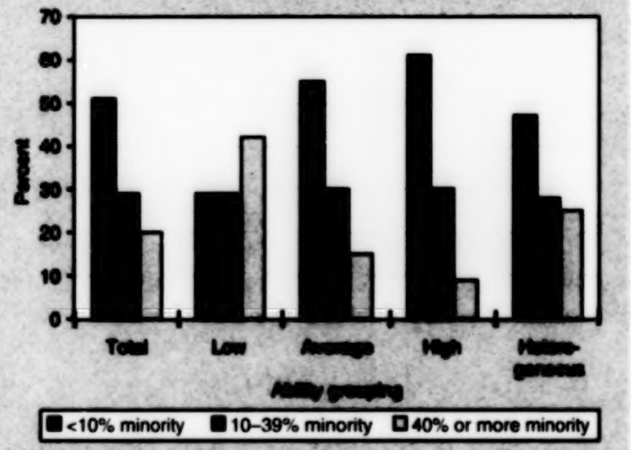
Ability Grouping

Many schools continue to group students according to ability levels. Grouping students by ability level is more prevalent in mathematics than in science and is more prevalent in grades 9–12 than in the lower grades (Weiss 1994). In both science and mathematics, classes with a high proportion of minority students are more likely to be "low-ability" classes than are classes with a low proportion of minority students. For example, in grades 9–12, 29 percent of the classes with a low proportion of minority students are labeled "low-ability" classes, but 42 percent of the classes with at least 40 percent minority students are so labeled. Conversely, 61 percent of the classes with a low proportion of minority students, but only 9 percent of the classes with a high proportion of minority students, are labeled "high-ability" classes. (See figure 2-5.)

Teacher Expectations

Being labeled by ability has a profound impact on student achievement because teachers tend to have different expectations of students in the various groups. Teachers in high-ability classes are more likely to emphasize the development of reasoning and inquiry skills than are those in low-ability classes. Students in low-ability classes are more likely to read from a textbook and less likely to participate in hands-on science

Figure 2-5.
Grades 9–12 mathematics classes by ability grouping and percent minority students: 1993



See appendix table 2-18.

American Indian Schools

Fewer than half of American Indian 12th graders score at or above a basic achievement level in mathematics. (See appendix table 2-7.[2]) American Indians are 1 percent of students attending public schools and Bureau of Indian Affairs (BIA)/tribal schools in the United States. Eight percent of these attend BIA/tribal schools, 36 percent attend public schools with a high (25 percent or more) American Indian enrollment, and 56 percent attend public schools with a low (less than 25 percent) American Indian enrollment (Pavel et al. 1995, p. 10).

Schools with high American Indian enrollment differ from those with low American Indian enrollment in availability of programs and services and in characteristics of teachers. They are more likely to offer compensatory programs and are less likely to offer college preparatory programs. All BIA/tribal schools and 82 percent of public schools with high American Indian enrollment have Chapter 1 programs, which are designed to address the needs of educationally disadvantaged children. (See appendix table 2-19.) By comparison, 66 percent of schools with low American Indian enrollment have Chapter 1 programs. BIA/tribal schools are more likely to offer remedial mathematics (80 percent) than public schools with either high or low American Indian enrollment (61 percent and 60 percent, respectively). College preparatory programs are offered less frequently by BIA/tribal schools (54 percent) and public schools with high American Indian enrollment (56 percent) than by schools with low American Indian enrollment (76 percent). The teachers at BIA/tribal schools and schools with high American Indian enrollment are less likely to be certified, and have fewer years of teaching experience. Both the teachers and the principals in BIA/tribal schools and schools with high American Indian enrollment see poverty, parental alcohol/drug abuse, and lack of parental involvement as serious problems in their schools. (See appendix table 2-20.)

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[2] In 1990–1991, the NCES Schools and Staffing Survey conducted an American Indian/Alaskan Native supplement to gather data on the unique characteristics of predominantly American Indian schools.

activities, are more likely to spend time doing worksheet problems, and are less likely to be asked to write reasoning about solving a mathematics problem. (See appendix table 2-16.)

Qualifications of Teachers

Minority students also have less access to qualified teachers. Mathematics classes with a high proportion of minorities are less likely than those with a low proportion of minorities to have mathematics teachers with majors in the field. (See appendix table 2-17.) Schools with a high proportion of minorities, however, do not differ from schools with a lower proportion of minorities in teachers' highest degree earned. (See appendix table 2-18.)

Curriculums Emphases

The instructional emphases in largely minority classes are likely to differ as well. The teachers in science and mathematics classes that have a high percentage of minority students are more likely to emphasize preparing students for standardized tests and are less likely than those having fewer minority students to emphasize preparing students for further study in science or mathematics. (See appendix table 2-17.)

Students With Disabilities

Elementary and secondary students with disabilities have special needs that may hinder their ability to participate fully in science and mathematics instruction. In 1993, approximately 7 percent of students in public elementary and secondary schools received services through programs for students with disabilities. (See appendix table 2-21.)

Special Education Services

The incidence of elementary/secondary students receiving services because of disabilities is increasing. Approximately 6 percent of the population of children in the United States from birth through age 21 were in federally supported special education programs in 1992–1993, compared with 4.5 percent in 1976–1977 (U.S. Department of Education, Office of Special Education and Rehabilitative Services 1994, p. 7). The increase has variously been explained as due to an increased fraction of the Nation's children living in poverty, increased prenatal exposure to alcohol or drugs, or an increase in reporting because of changes in eligibility criteria.

More than half of the children ages 6 through 21 with disabilities had specific learning disabilities, and another one-fifth had speech or language impairments. (See appendix table 2-22.) About 12 percent are mentally retarded, 9 percent have a serious emotional disturbance, and about 1 percent each have orthopedic, hearing, or other health impairments. Less than 1 percent have visual impairments.

Depending on the nature of their disability, students may be served in regular classrooms and be provided with special services via a resource room, or they may receive instruction at a variety of special sites. Special education sites may not offer the same access to science instruction as regular classrooms, because often science instruction needs, especially in the higher grades, are equipment or facility intensive. Students with speech or language impairments were most likely to spend more than half of their class time in regular education academic classes (see appendix table 2-23) and thus have access to science instruction similar to that of students without disabilities. Students with other, less prevalent disabilities, such as hearing or mobility impairments, were more likely to be taught in separate classes.

Science and Mathematics Education

Students with physical disabilities make up 4 to 6 percent of the science students and 2 to 6 percent of the mathematics students in grades 1–12. Students with mental disabilities make up 2 to 9 percent of the science students and 1 to 5 percent of the mathematics students in grades 1–12. Students with mental disabilities are more likely to be included in regular science instruction than in mathematics instruction.

The fraction of students with learning disabilities is much smaller in high school than in the earlier grades. Slightly more than half of the science and mathematics classes in grades 1–4 but only 31 percent of the science classes and 24 percent of the mathematics classes in grades 9–12 have students with learning disabilities. (See figure 2-6.) The fraction of students with physical and mental disabilities is much smaller and varies less by grade. Four percent of science classes and 6 percent of mathematics classes in grades 1–4 have at least one student with a physical disability, compared with 5 percent of science classes and 2 percent of mathematics classes in grades 9–12.

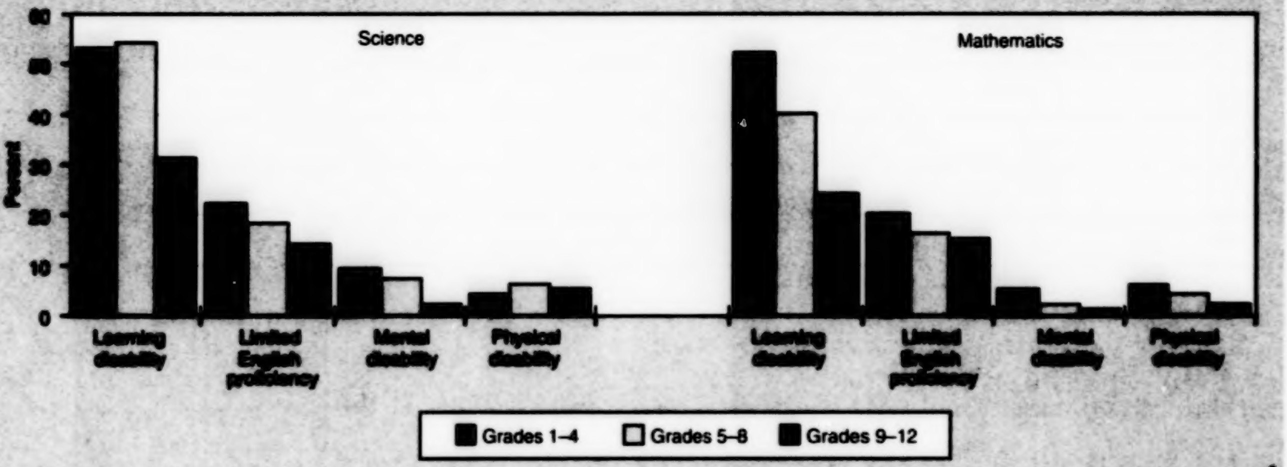
Transition to Higher Education

The transition from elementary/secondary school to higher education is an important step not only to the individuals making it, but also to a nation committed to the well-being of its citizens. Information on persons making this transition provides opportunities for the assessment of their progress through the stages just completed and their readiness for future activities. In this report, the transition points mark an important opportunity for examining the status of underrepresented groups as they progress through the educational system.

College Entrance Examinations

Two organizations administer national college entrance examinations—the Admissions Testing Program of the

Figure 2-8.
Percentage of science and mathematics classes with one or more students with disabilities, by grade: 1993



See appendix table 2-24.

College Entrance Examination Board, which administers the Scholastic Aptitude Test (SAT), and the American College Testing Program, which administers the American College Testing (ACT) Assessment. Results of these examinations are of substantial importance to college admissions decisions and hence to opportunities for college students. A close analysis also offers further insight into the precollege preparation of women and underrepresented minorities. Substantial differences remain in standardized test results among the various groups at the critical transition point from secondary school to higher education.

Women

Scholastic Aptitude Test

The Admissions Testing Program of the College Entrance Examination Board collects and tabulates data on the scores of college-bound seniors who have taken the SAT. The College Board uses the term "college-bound senior" to refer to those students from each high school graduating class who take the SAT Program tests anytime during their high school years.[3] The SAT examination consists of two components: the verbal component, which tests reading comprehension and vocabulary skills, and the mathematics component, which assesses the ability to solve problems by using arithmetic reasoning as well as skills in basic algebra and geometry.[4] The score range for each SAT component is from 200 to 800.

In 1994, almost 1.1 million students took the SAT tests; females constituted 53 percent of the total. (See appendix table 2-25.) Continuing a long-time trend, in 1994 females scored below males in both the mathematics and verbal portions of the SAT. This pattern persists despite the fact that females tend to have higher overall grades in high school than males,[5] and they tend to have better grades in college (see the related discussion on undergraduates in chapter 3). Educators and researchers both in the academic community and within the College Board have been concerned about the underlying causes of this disparity.[6]

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[3] Students are counted only once regardless of the number of times they take the same test(s). The College Board reports that these test takers represent approximately 42 percent of all students who enter college each year, and approximately 64 percent of all entering first-year, full-time students. (*College Bound Seniors, 1994 Profile of SAT and Achievement Test Takers.* Princeton, NJ: Educational Testing Service.)

[4] In 1987 the College Board initiated a review of the Admissions Testing Program, and the SAT Program made significant changes in 1993–1994. Through the January 1994 test administration, SAT Program tests included the SAT, the Test of Standard Written English (TSWE), and the Achievement Tests. Beginning in March 1994, the SAT program was revised into two formats: the SAT I: Reasoning Test (the mathematical and verbal sections, with revisions beginning in March 1994) and the SAT II: Subject Tests (formerly known as the Achievement Tests, with the revisions beginning in May 1994).

The College Board reports that the SAT I: Reasoning Test is comparable to the SAT, and therefore scores from this test are included in trend data in this report, and continue to be labeled "SAT." Changes to the Achievement Tests data are noted in the SAT II: Achievement Tests portion of this report. (Data for the TSWE, which is no longer being administered by the College Board, have never been included in the *Women and Minorities* series.)

[5] Based on data reported by the test takers themselves, 21 percent of the females had overall grades of A or A+, whereas 16 percent of the males scored that well. (See appendix table 2-25.)

[6] See, for example, "How Does the SAT Score for Women?" National Coalition for Women and Girls in Education, Washington, DC, July 1990, or "Sex Differences in SAT Predictions of College Grades," Lawrence Stricker, Donald Rock, and Nancy Button. The College Board Report. No. 91-2. New York, NY, 1991.

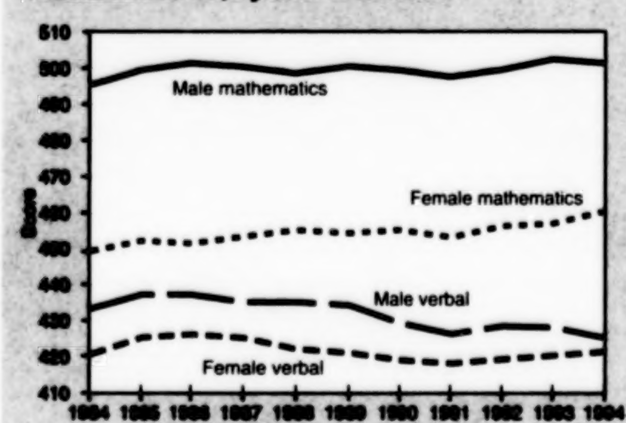
SAT Scores and High School Classes

Mathematics. On the mathematics component of the SAT, scores for both sexes have risen during the decade since 1984, a period of increased emphasis on mathematics and science education at the K–12 level. Nevertheless, females in 1994 continued to score considerably below males in the mathematics component, the gap narrowing only slightly over the decade. (See figure 2-7.) Since 1984, females' scores increased 11 points to 460 in 1994, whereas males' scores increased 6 points to 501. Thus, there was a 41-point difference in scores in 1994, down from a 46-point difference in 1984. (See appendix table 2-26.)

This large difference in mathematics scores between the two sexes occurred despite the similarity in many of their high school characteristics. In 1994, females who took the SAT exam reported completing an average of 3.6 years of mathematics coursework compared with 3.7 years for males. Females received a grade point average of 2.96 in mathematics, compared with a mathematics grade point average of 2.97 for males.[7] (College Entrance Examination Board 1994, p. 10).

Verbal. In 1994, females also continued to score somewhat lower than males on the verbal component of the SAT. (See figure 2-7.) This occurred even though females reported a higher high school grade point average than males in both English and social sciences/history.[8] Females also took a higher average number of years of coursework in English (3.9 years for females versus 3.8 years for males) and social sciences/history (3.4 years for females versus 3.3 years for males) (College Entrance Examination Board 1994, p. 10).

Figure 2-7.
Mean SAT scores, by sex: 1984–1994



NOTE: The score range is 200 to 800.
See appendix table 2-26.

SAT Scores and Level of Difficulty of High School Mathematics and Science Courses

The propensity for taking difficult coursework in high school may account for some of the differences between males and females in mathematics test scores, according to an analysis of the profile data reported by high school seniors who take the SAT. In particular, although males and females had almost the same percentage taking honors courses and had almost identical grade point averages in the mathematics courses they took, a smaller percentage of females took 4 or more years of mathematics,[9] and a much smaller percentage of females took the most advanced coursework.

The discrepancy in course taking between the males and the females taking the SAT occurs in courses that are generally electives, i.e., those following the geometry course. For example, 96 percent of both males and females took algebra, and 93 percent of both genders reported taking a geometry course. There is a gap of 3 percent, however, in male/female participation in both trigonometry (53 percent for females versus 56 percent for males) and precalculus (34 percent for females versus 37 percent for males). The gap widens to a 5 percent difference in the proportion taking calculus (19 percent for females versus 24 percent for males). (See appendix table 2-27.)

This difference in propensity to take the more difficult mathematics courses undoubtedly contributes to the male–female differences in scores. Females were much less likely than males to place in the top range of scores on the mathematics component of the SAT, i.e., in the 600 to 800 range. In 1994, only 14 percent of females scored in this top range versus 24 percent of males. (See appendix table 2-28.)

A similar pattern is evident in enrollment in natural science classes. Females' grade point averages are very similar to males' in the courses they take; both sexes take about the same number of years of coursework; and they participate equally in the percentage taking honors courses.[10]

As is the case with mathematics, however, a smaller percentage of females take the most advanced coursework in the natural science fields. For example, 97 percent of all students who took the SAT, both female and male, had taken biology, and 83 percent of both sexes had taken chemistry. Only 41 percent of females took physics, however, compared with 51 percent of males.

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[7] Based on the grading of A = 4 points, B = 3 points, C = 2 points, and D = 1 point.

[8] Females earned a grade point average of 3.26 in English, compared with 3.01 for males; they earned a grade point average of 3.24 in social sciences/history, compared with 3.19 for males.

[9] Seventy-one percent of the males took 4 or more years of mathematics in high school, and 68 percent of the females took that much mathematics. (See appendix table 2-27.)

[10] In 1994, female college-bound seniors reported that they had studied natural science for an average of 3.2 years versus 3.3 years for males. Females earned an average grade point average of 3.09 in the natural science courses they took, versus a slightly lower grade point average of 3.05 for males. The percentage who reported taking an honors course in natural science was identical for both sexes (26 percent).

(See the related discussion above concerning a study by Neuschatz and Alpert, American Institute of Physics.) In coursework intensiveness, 45 percent of females took 4 or more years of natural science, compared with 50 percent of males.

SAT II: Achievement Tests

The differences in coursework taken may also affect the differences between males and females in scores received on the achievement tests offered by the Admissions Testing Program of the College Board.[11] Although females took 50 percent of the achievement tests in science and mathematics in 1994,[12] female participation was concentrated in the less advanced mathematics I exam in which females took 57 percent of the total, and in biology (55 percent of the total). Males took the majority of all the other mathematics and science achievement test exams. Female participation was lowest in physics, in which they took only 26 percent of the exams.

In the mathematics and science achievement tests they did take, females' mean scores were lower than the mean scores for males in 1994. (See appendix table 2-29.) The discrepancy ranged from 31 points on the biology test to 53 points on the physics exam. The spread between scores on the new math level IIC was 45 points (650 for females and 695 for males).

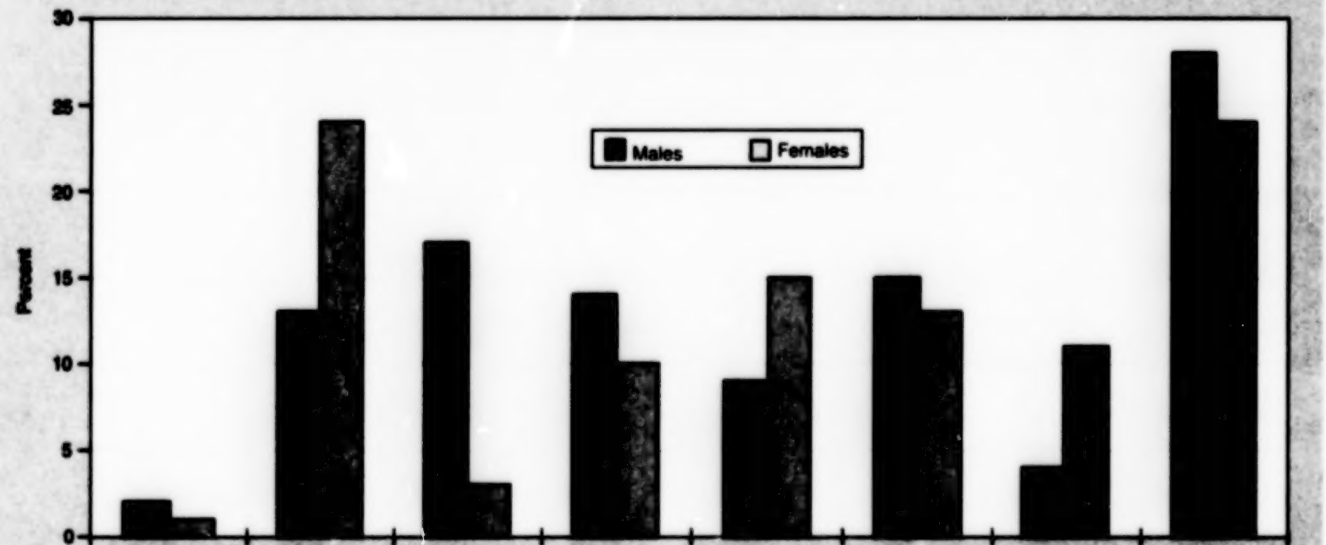
Intended Undergraduate Major

Differences between females and males in their intended preference for degree major are striking for students planning to enter college. Perhaps in keeping with their lower scores on the mathematics SAT, relatively few females about to enter college in 1994 intended to pursue a major in engineering. (See figure 2-8.) Only 3 percent of females intended to major in this subject, whereas 17 percent of males intended to major in engineering, the highest percentage for any individual major for males. (See appendix table 2-30.)

Twenty-four percent of females cited health and allied services as their most probable major. Business and commerce was the next most popular field for women (13 percent), followed by education (11 percent). For males, business and commerce was also the second most popular probable major (15 percent), followed by health and allied services (13 percent). Education was mentioned by just 4 percent of the males.

Combining all natural science fields, 14 percent of the males intended to pursue these majors, and 10 percent of the females chose these fields as probable majors: two percent of males chose agriculture/natural resources as their major, compared with 1 percent of females. One percent of males chose mathematics as a major, and less than 0.05 percent of females did. Double the percentage of males than females also chose the physical sciences (2

Figure 2-8.
Percentage of college-bound seniors by intended undergraduate major and sex: 1994



See appendix table 2-30.

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[11] Through January 1994, the achievement test series included multiple choice exams in 14 academic areas. Beginning in March 1994, the Achievement Tests were expanded and renamed. They are now called the SAT II: Subject Tests to reflect the addition of new test offerings in various subjects. (Results for the science and mathematics tests, as well as for the new mathematics test, math IIC, are presented in appendix table 2-29.) The College Board reports that students who take achievement tests tend to apply to selective colleges and universities.

[12] Biology, chemistry, physics, math I, math II, and math IIC (first introduced in 1994).

percent and 1 percent, respectively) and computer sciences (4 percent and 2 percent). Only in the biological sciences did a larger proportion of females choose the discipline—6 percent of females chose biological sciences, compared with 5 percent of males.

Minorities

Scholastic Aptitude Test

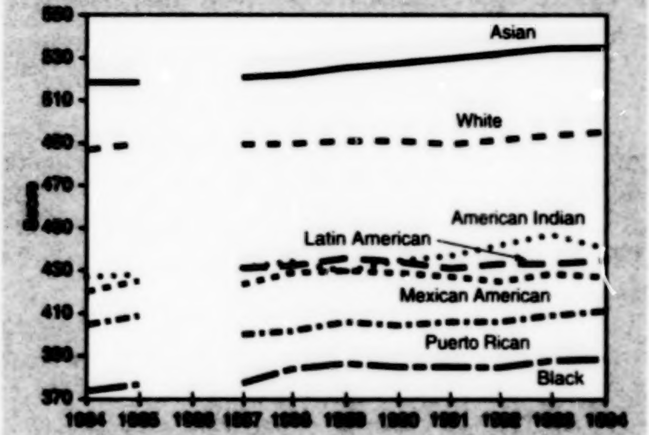
Mathematics. An analysis of the descriptive information submitted by students taking the SAT reveals a wide divergence in precollege preparation among the racial/ethnic groups. These differing rates of participation in mathematics and science training in elementary and secondary school are reflected in the scores received on the mathematics portion of the SAT.

Compared with whites, the three minority groups underrepresented in science and engineering—blacks, Hispanics,[13] and American Indians—tend to take fewer courses in mathematics and science. Asians, who engage in science and engineering in larger proportions than their percentage of the general population, take more science and mathematics high school courses than whites. An analysis of scores reveals that, overall, Asians perform better than all other racial/ethnic groups on the mathematics component of the SAT and on the science and mathematics achievement tests; whites score second highest. Asians also tend to take more of the difficult mathematics and science courses in high school than do students in other groups. (See appendix table 2-27.)

On the mathematics component of the SAT, the scores of every racial/ethnic group improved over the decade, again undoubtedly reflecting increased emphasis on improving mathematics and science education at the K–12 level. (See figure 2-9.) The relative standing of the racial/ethnic groups did not change over the 10-year period, however; the groups scored in the same rank order as in 1984.

In 1994 Asians continued to have the highest average mathematics SAT scores, followed in order by whites and American Indians, Latin Americans, Mexican Americans, Puerto Ricans, and blacks. (See appendix table 2-26.) Asian students also achieved the highest increase in mathematics scores of any racial/ethnic group, with scores rising 16 points over the decade. Black students achieved the second highest increase in scores since 1984 (15 points), and American Indian students achieved a 14-point increase.

Figure 2-9.
Mean SAT mathematics scores, by race/ethnicity: 1984–1994



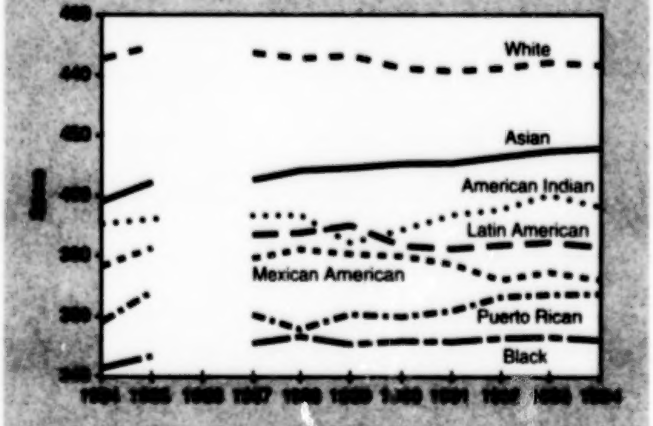
NOTES: The score range is 200 to 800. No data are available for 1986. Data for Latin Americans are not available until 1987.

See appendix table 2-26.

Verbal. On the verbal component of the SAT, whites had the highest mean scores in 1994, followed by Asians and American Indians. (See figure 2-10.) The relative ranking of these groups remained about the same between 1984 and 1994, but several significant changes occurred in the level of the verbal scores. Asians achieved the highest increase in scores of any racial or ethnic group; their verbal scores rose every year for a total increase of 18 points over the decade.

Blacks had the second highest increase in mean verbal scores (10 points), whereas American Indians increased their verbal scores by 6 points. Scores by whites fluctuated slightly over the decade but decreased by 2 points overall between 1984 and 1994. Trend data on Hispanics are more difficult to compare because of

Figure 2-10.
Mean SAT verbal scores, by race/ethnicity: 1984–1994



NOTES: The score range is 200 to 800. No data are available for 1986. Data for Latin Americans are not available until 1987.

See appendix table 2-26.

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[13] Data for Hispanic groups are available separately and are presented in this report at the most detailed level possible. SAT data for Hispanics were subdivided in 1987 from two ethnic groups into three ethnic groups, so that the 10-year trend of specific Hispanic subgroups is not comparable. (The subgroup "Latin American" was available as an option beginning in 1987, in addition to the previously available subgroups "Mexican American" and "Puerto Rican.") Since 1987, scores for those who listed themselves as Latin American tended to be higher than the scores for Mexican Americans or Puerto Ricans.

the data subdivision in 1987. Of the three Hispanic groups, however, only the Puerto Ricans had verbal scores higher in 1994 than in 1987: they rose a total of 7 points by 1994.

SAT Scores and Level of Difficulty of High School Mathematics and Science Courses

The amount and type of coursework taken in high school are related to the scores achieved on the SAT. In particular, Asians and whites, the two groups with the consistently highest mathematics scores on the SAT, were also the two groups who had taken the most courses in mathematics and natural science in high school.

Science. In 1994, 89 percent of college-bound Asians, 85 percent of whites, and 80 percent of Latin Americans took chemistry in high school; roughly three-quarters of each of the other groups took chemistry. The biggest difference in participation rates among racial/ethnic groups in science coursework was in physics. Sixty-five percent of Asians took physics, compared with 47 percent of whites, 44 percent of Latin Americans, and 40 percent of Puerto Ricans. For all the other racial/ethnic groups, less than 35 percent of the college-bound students took physics. (See appendix table 2-27.)

Mathematics. As with females, high percentages of college-bound students from all racial/ethnic groups took algebra and geometry, but the percentage of participation starts to diverge after these two basic high school mathematics courses. Asians were again the most prepared in terms of coursework taken. Sixty-nine percent of Asians took trigonometry, whereas the next highest proportions were 55 percent for whites and 51 percent for Latin Americans. No other racial/ethnic group had a majority of their college-bound seniors taking trigonometry in high school.

The gap widens even further in precalculus: 53 percent of the Asians took that course in high school. The whites' proportion was 17 percentage points behind; 36 percent took precalculus. All other racial/ethnic groups had fewer than one-third of their students taking precalculus in 1994.

Only a minority of all racial/ethnic groups took calculus in high school, yet even here Asians participated at the highest level. Forty percent of Asians took calculus, as did 22 percent of whites. In all other groups, fewer than 20 percent of their student college-bound population took calculus.

Parental Income and SAT Scores

The SAT data show that for every racial/ethnic group, higher reported levels of parental income are generally associated with higher scores on both the verbal and mathematics sections of the SAT. Family income does not uniformly relate to level of achievement, however. The mean SAT mathematics score of 482 for those Asian students at the lowest family income level (under $10,000) exceeded the scores at the highest family levels for several of the underrepresented minorities groups. (See appendix table 2-32.)

Parental Education and SAT Scores

Within every racial/ethnic group, higher levels of parental education were associated with higher students' scores on both the mathematics and verbal portions of the SAT. For example, the difference in mean SAT mathematics scores between the group whose parents did not receive a high school diploma and those whose parents held a graduate degree ranged from 120 points for whites to 85 points for blacks. (See appendix table 2-33.)

A majority of college-bound students in four racial/ethnic groups reported that the highest level of education attained by their parents was a high school diploma or less (Mexican Americans, 70 percent; blacks, 57 percent; Puerto Ricans, 55 percent; and Latin Americans, 54 percent). Although these four groups tended to score lowest on the SAT, within each of these groups the parental education pattern held: average SAT scores increased with the increase in the level of the parents' education.

Citizenship Status and SAT Scores

More than 90 percent of college-bound students taking the SAT in 1994 were U.S. natives or naturalized citizens in all but two of the racial/ethnic groups studied,[14] but only 59 percent of the Asian students taking the SAT and 68 percent of the Latin American students taking the SAT were U.S. natives or naturalized citizens. An additional 27 percent of Asians were permanent residents or refugees, and 15 percent were citizens of another country. For Latin Americans, an additional 23 percent were permanent residents or refugees, and 9 percent were citizens of another country. (See appendix table 2-34.)

Verbal Scores. For all but one racial/ethnic group, verbal SAT scores of U.S. native or naturalized citizens were higher than the verbal scores for either permanent residents/refugees, or for citizens of another country—undoubtedly reflecting the higher proportion of students for whom English is the first language learned. Blacks are the one exception to this pattern of scores. The mean verbal score for black citizens from another country was 29 points above the mean verbal score of black U.S. citizens (381 versus 352). Citizens from another country constituted only 2 percent of blacks taking the SAT, however.

Mathematics Scores. The pattern of higher U.S. citizen scores changes for the mathematics component of the SAT. In all but two racial/ethnic groups—Mexican Americans and Puerto Ricans—the citizens from other

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[14] The SAT's descriptive questionnaire also contains a question on citizenship status.

Course Taking and Test Performance

The American College Testing (ACT) Assessment is another national college-entrance examination whose results are used by many college administrators as part of their admissions procedures.[15] Students taking the ACT are asked to self-report details of the high school curriculum that they have taken.

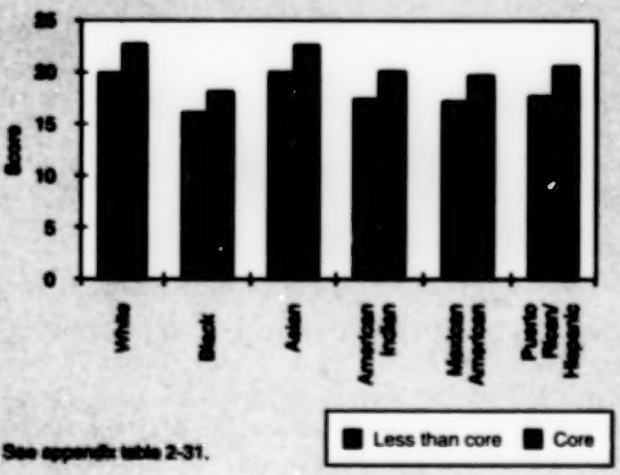
ACT officials have identified a certain series of high school courses as "core" courses, i.e., those that are recommended as college preparatory courses.[16] By correlating the self-reported coursework data with the ACT test scores, ACT officials are able to compare the scores of students who have taken at least the core courses with the scores of students who have taken less than the core curriculum. Students who completed the core subjects scored higher on the ACT tests than those who had not taken all the core courses. An encouraging note is that ACT officials report that over 57 percent of the ACT-tested 1994 high school graduates reported that they had taken the core coursework, a 2.4 percent gain over the 1993 proportion, and an increase of 19 percent since 1987.[17]

In every racial/ethnic group, the composite scores of the students who took the core courses were at least 12 percent above the composite scores of those who had not. An analysis of students taking the core courses reveals a pattern of less participation by the underrepresented minorities. (See figure 2-11.) All ethnic groups, however, are increasing their participation in the core curriculum. In 1993, for example, a majority of white, Asian, and Puerto Rican students took the core courses, but a majority of black and American Indian students did *not* take the core course series in that year, and the number of Mexican American students who took the core courses was virtually even with the number who did not. In 1994, in contrast, a majority of students from all racial/ethnic groups except one took the core courses.

American Indians were the one exception, and those students who took the core course of study scored 17 percent higher on the composite score than the students who did not complete the core coursework, the highest percentage difference in scores of any racial/ethnic group. A majority of both males and females in the American Indian group did not take the core courses (47 percent for both sexes); this ethnic group was the only one in which a majority of the females did not take the core courses. (See appendix table 2-31.) Only a minority of black males took the basic core curriculum (48 percent), whereas a majority of both males and females from all other racial/ethnic groups took at least the core curriculum in 1994.

Analyzed by type of ACT test, females scored higher than their male counterparts in the English and reading tests. Mirroring the results in the SAT mathematics scores, females in each racial/ethnic group scored lower than their male counterparts on the ACT mathematics and science reasoning tests. (See appendix table 2-31.) Across racial/ethnic lines, however, many females scored higher than males in other groups. In fact, female Asians scored higher on the mathematics test than all non-Asian males, for both the core group and those not taking the core curriculum.

Figure 2-11.
Composite ACT scores of students who took core subjects and less than core subjects in high school, by race/ethnicity: 1994



See appendix table 2-31.

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[15] ACT officials report that college-bound students who take the ACT Assessment are in some respects not representative of college-bound students nationally. First, students who live in the Midwest, the Rocky Mountains and Plains, and the South are overrepresented among ACT-tested students as compared with college-bound students nationally. In addition, ACT-tested students tend to enroll in public colleges and universities more frequently than do college-bound students nationally (American College Testing Program 1994b).

[16] ACT officials define a "core or more" program as consisting of 4 or more years of English, 3 or more years of mathematics, 3 or more years of social studies, and 3 or more years of natural science. "Less than core" refers to any high school program consisting of fewer courses than those included in core or more.

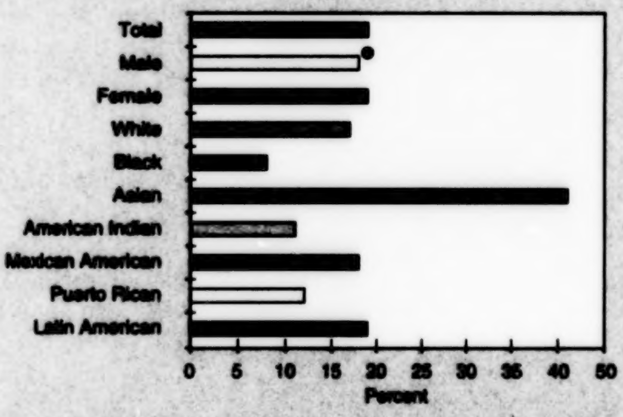
[17] American College Testing Program 1994b, p. 3.

countries achieved higher mathematics SAT scores than did the U.S. citizens. The number of foreign citizens in these two ethnic groups was very small, however, constituting one percent or less of each group.

SAT II: Achievement Tests

Approximately 19 percent of all students who took the SAT in 1994 also took at least one achievement test. The proportion of students taking at least one achievement test varies dramatically by racial/ethnic group. Although whites (17 percent), Mexican Americans (19 percent), and Latin Americans (20 percent) all took achievement tests at a rate similar to the national average of 19 percent, the proportion was lower for Puerto Ricans (12 percent), American Indians (11 percent), and blacks (9 percent). On the other hand, the proportion of Asian SAT takers who also took at least one achievement test (42 percent) was far above the national average. (See figure 2-12.)

Figure 2-12.
Percentage of students taking the SAT who also took at least one achievement test, by sex and race/ethnicity: 1994



SOURCE: College Entrance Examination Board. 1994. *College Bound Seniors, 1994 SAT Profile, Profile of SAT and Achievement Test Takers.* Princeton, NJ: Educational Testing Service.

Intended Undergraduate Major

Racial/ethnic differences in choice of undergraduate major are less dramatic than the differences by sex. Particularly when the social sciences are separated from the natural sciences and engineering, the differences in preference by sex become striking: the proportion of males intending to major in natural sciences and engineering was significantly higher in all racial/ethnic groups than the proportion of females intending to major in these subjects. (See appendix table 2-30.)

For instance, the proportion of males intending to major in natural science/engineering ranged from 28 percent for American Indian and Puerto Rican males to 37 percent for Asian males. For females, however, the proportion intending to study natural science/engineering was much lower, ranging from 12 percent for Mexican Americans to 16 percent for Asians.

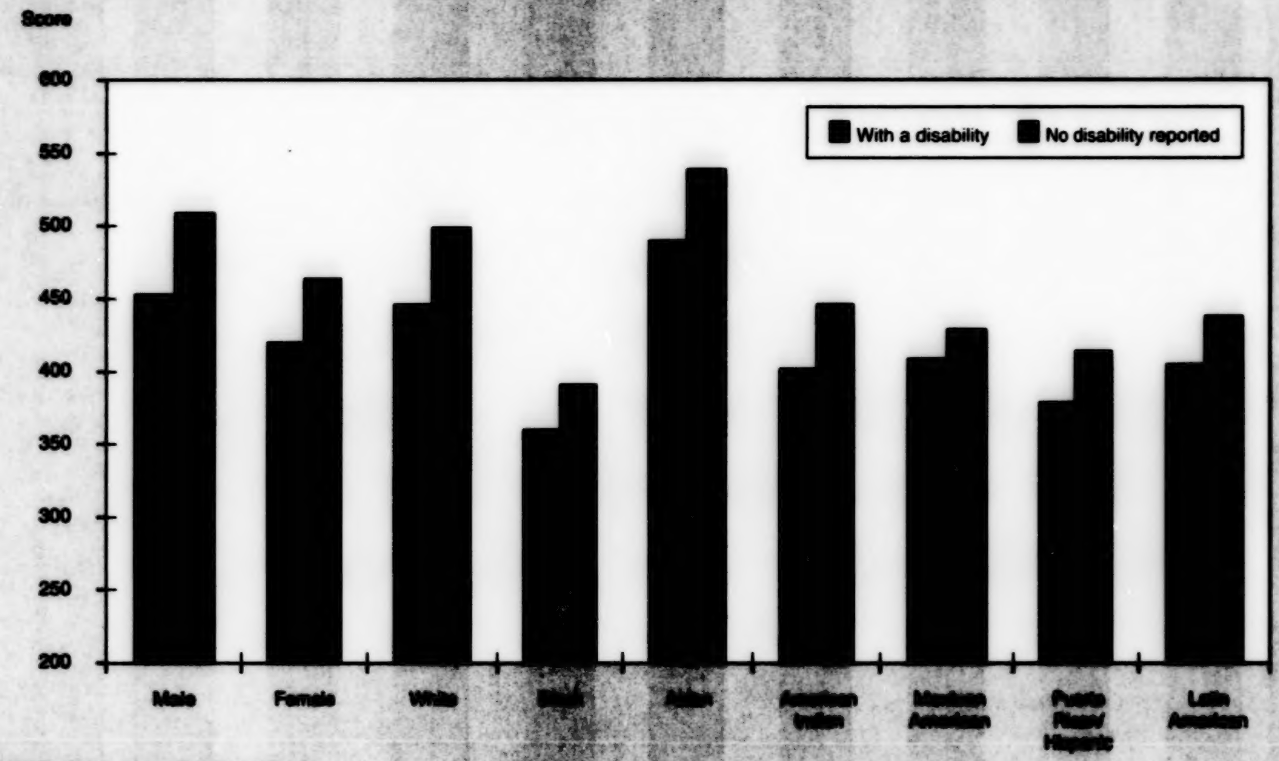
At the time they took the SAT in 1994, only 3 percent of all females intended to study engineering, and females in every racial/ethnic group exhibited the same low priority for engineering study. Black and Asian females intended to major in engineering more often than females of other racial/ethnic groups, but their 5 percent participation was still far below the percentage of males intending to major in engineering (19 percent for blacks and 22 percent for Asians). White and American Indian females were the least likely to choose engineering majors (3 percent each).

Persons With Disabilities

Scholastic Aptitude Test

Four percent of college-bound high school students taking the SAT in 1994 reported a disabling condition; they tended to have lower mean scores on the SAT than did seniors who reported having no disabilities. (See figure 2-13 and appendix table 2-35.) In mathematics, the average score for students with disabilities was 436, compared with 483 for other students. On the verbal exam, the average score for students with disabilities was 391, compared with 427 for students who reported having no disabling condition.

Figure 2-13.
Mean SAT mathematics scores of college-bound seniors, by sex, race/ethnicity, and disability status: 1994



NOTE: Score range is 200 to 800.
See appendix table 2-35.

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CHAPTER 3

THE UNDERGRADUATE EXPERIENCE IN SCIENCE, MATHEMATICS, AND ENGINEERING

To maintain and improve its standard of living, the United States needs a citizenry and workforce informed in science and engineering. Higher education is essential to this goal, but completion rates of undergraduate study in these fields are unequal—women and minorities except for Asians are underrepresented compared to their presence in the population. This chapter examines aspects of postsecondary education in science and engineering from enrollment to graduation in 2- and 4-year colleges and universities that serve undergraduates and, in some cases, graduate students as well.

This review of the undergraduate level examines changes in enrollment at all institutions of higher education, both of students intending to pursue studies in science and engineering fields and, very briefly, of others. Because of science and technology's increasing importance, more students need more science, mathematics, and engineering courses either to fulfill general requirements or to select as electives. After a consideration of some of the characteristics of the first 2 years of undergraduate science, mathematics, and engineering education at 2-year and at 4-year-and-beyond institutions, this chapter looks at selected patterns in undergraduate science and engineering study and discusses educational environments that influence attrition and retention in these fields.

This chapter notes certain trends in the postsecondary experience of members of racial/ethnic groups underrepresented[1] in science, mathematics, and engineering studies, sometimes in comparison with that reported by undergraduates in other fields. It makes some distinctions between the characteristics of students in associate-level community and junior colleges and those of many first- and second-year students planning from the outset to finish baccalaureate degrees. It analyzes both enrollment distribution and outcomes—the kinds of degrees earned—among target groups and across disciplines and institutions.

Patterns in Undergraduate Education

A decade-long pattern of rising undergraduate enrollment among all students in all undergraduate programs ended in 1993, when 210,965 fewer students enrolled in higher education institutions than in 1992, a 2 percent decline.[2] (See appendix table 3-1.) The numbers dropped for both men and women; however, the numbers of students in all racial/ethnic groups other than white, including foreign students on temporary visas, continued to rise. There were 3 percent fewer white undergraduates in 1993 than 1992 (although 7 percent more than in 1980). Hispanic students increased by almost 3 percent between 1992 and 1993 (about doubling between 1980 and 1993). Although American Indians' numbers went up very little (under 2 percent) between 1992 and 1993, their increase over the 13 years was over 44 percent. Blacks, up less than 2 percent from 1992, increased their numbers by more than 26 percent since 1980. Since 1992, Asians increased by about 4 percent (and by 155 percent since 1980). These trends in enrollment portray a growing diversity within the student population and provide a context for considering the outcomes by discipline areas.

Although *total* first-year enrollment at all undergraduate universities and colleges was down by 17,054 students, *full-time, first-year* enrollment inched up by 0.5 percent from 1992 to 1993. (See appendix table 3-2.) Asian and Hispanic enrollment, which increased by 7 percent and 8 percent, respectively, accounted for most of the overall increase.

First-year, full-time undergraduate enrollment went down from 1980 to 1993; men's enrollment declined more than women's. The drop in white non-Hispanics both in numbers and as a share of the first-year, full-time group—from 79 percent of this group in 1980 to 72 percent in 1993—accounted almost entirely for this decline. Numbers of beginning full-time students from nonwhite ethnic subgroups, like minorities in other U.S. population groups, continued to rise: over the 13-year period, Asian/Pacific Islanders went from 2 to 5 percent of this group; Hispanics, from 6 to 9 percent; blacks, up by half a percent to 11 percent.

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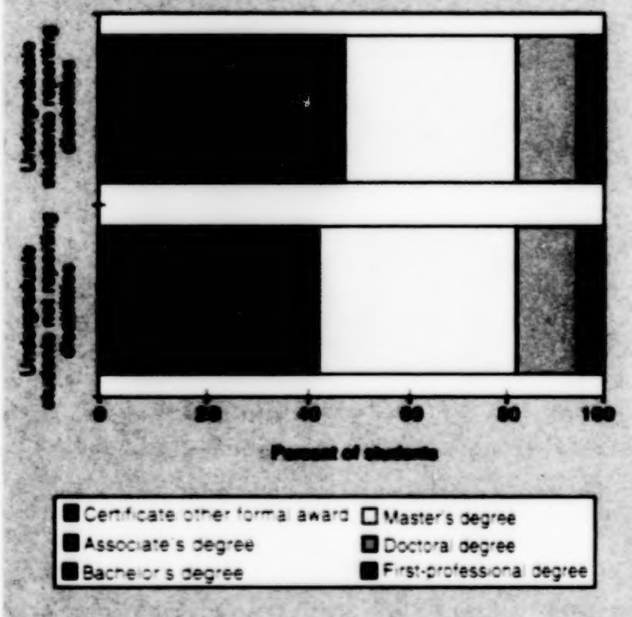
[1] According to Bureau of the Census projections, the minority population is on the rise; the workforce as a whole, unlike the population, is less than half female (46 percent in 1994) (Day 1993; U.S. Department of Commerce, Bureau of the Census 1993a, 1993b, 1993c, 1993d, 1993e).

[2] The enrollment data for the complete population of higher education students are from the U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System Fall Enrollment Survey, an annual data collection that obtains information from all accredited institutions of higher education in the country and imputes data for nonresponding units. Like many surveys, these data separate Asians (who are overrepresented in science, engineering, and mathematics in colleges, universities, and the professions) from other minorities. It also often distinguishes between "all institutions," including 2-year colleges and "4-year and beyond." The National Center for Education Statistics, however, does not collect data on student enrollment according to field.

Six and a half percent of students in 1993 reported having a disability.[3] (See appendix table 3-3.) Undergraduates claiming disabilities ranged in age from less than 18 years old to more than 30. These students had about the same degree aspirations as others. (See figure 3-1.)

Veterans were more likely to have a disability than were nonveterans, and older students were more likely to have a disability than those under age 24. Undergraduates with disabilities were more likely to attend school part time and to go to 2-year institutions than others, who clustered in 4-year-and-beyond universities and colleges. About 6 percent of students majoring in science and engineering had disabilities; so did about 7 percent of those in other fields.

Figure 3-1.
Degree aspirations of undergraduate students by disability status



SOURCE: Henderson 1995b, p. 3.

Some 37 percent of undergraduates received financial aid in 1992–1993. (See appendix table 3-4.) No significant difference is evident between students with and without disabilities in receiving financial aid overall. Greater percentages of students *without* disabilities in hearing, learning, and speech received funding than those *with* such problems. On the other hand, a larger proportion of students with orthopedic, visual, or other health-related disabilities received financial aid than those without them.

Full-Time 4-Year Enrollment

About 75 percent of all students were enrolled full time in 1993, continuing a pattern that had been stable for over a decade. Women and underrepresented minority students were as likely to be attending full time as white males, and over 80 percent of Asians and foreign students were enrolled full time. Women were 52 percent of the students enrolled in 1993 on a full-time basis at 4-year-and-beyond institutions. That year they made up 54 percent of total enrollment at such institutions, up from 51 percent of this group in 1980. (See appendix table 3-5.)

Minorities and foreign students made up 26 percent of full-time enrollment at baccalaureate-level-and-beyond colleges; underrepresented minorities, 18 percent, an increase from 14 percent in 1980.

The First 2 Years

First-Year Enrollment

Trends in enrollment of first-year and full-time, first-time, first-year students are important indicators for future enrollment in higher education. They not only reflect to some extent the size of the population traditionally entering college, but they also reveal changing patterns among students' higher education enrollment choices. The number of full-time, first-year students at 4-year-and-beyond institutions, a number that fluctuated during the 1980s, remained 5 percent lower in 1993 than it had been in 1980. (See appendix table 3-6 and figure 3-2.) This trend parallels an overall decline since 1981 in the 18- to 24-year-old U.S. population (U.S. Department of Commerce, Bureau of the Census 1995).

The full-time, first-time students enrolled in 1993 remained 5 percent below 1980 levels. A slight—1 percent—increase in this cohort between 1992 and 1993 comprised about two-thirds women and one-third men. Women were 53 percent of first-time, first-year students in 1993, up only slightly from 52 percent in 1980. Since then, however, minority enrollment has increased. More than twice as many Asian students were among first-time students enrolled in 1993 than 13 years earlier, going from 2 percent of that group in 1980 to 5 percent in 1993.

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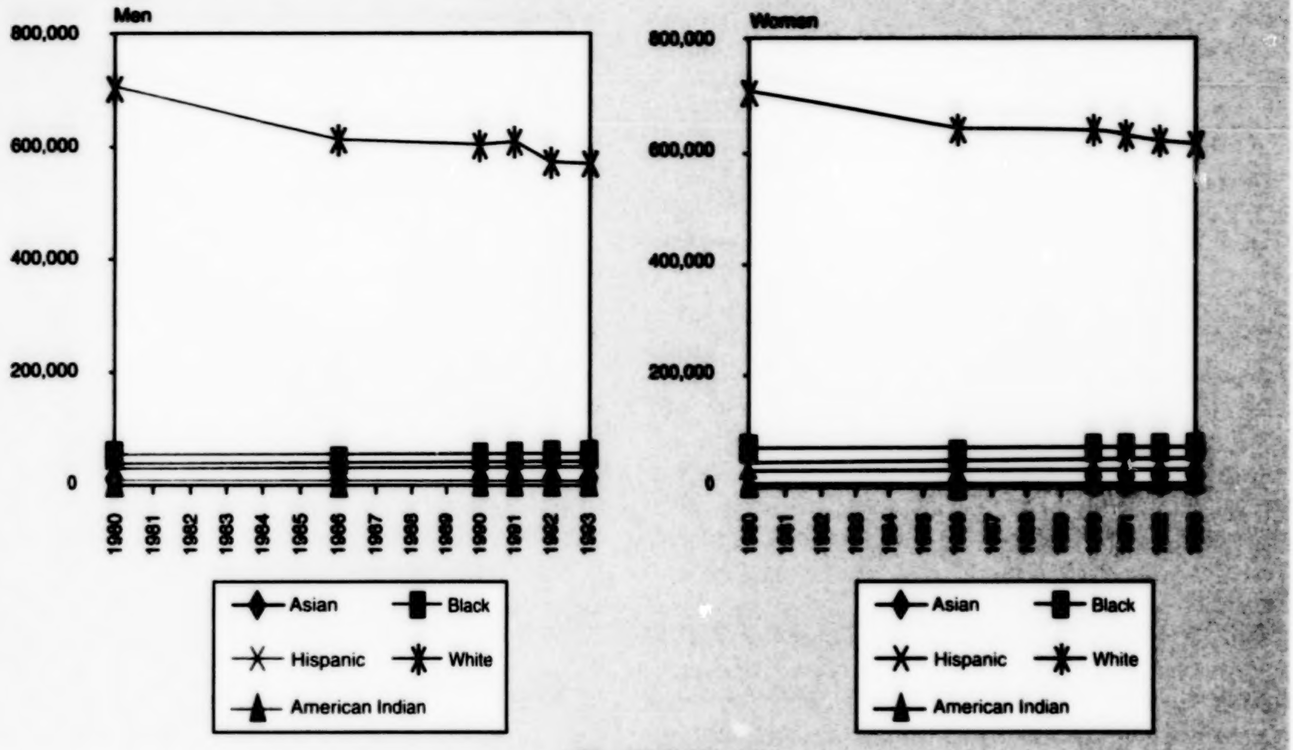
[3] Other National Center for Education Statistics data offer selected information about postsecondary students with disabilities. The U.S. Department of Education's National Postsecondary Student Aid Study in 1993 asked undergraduates and graduates if they had a functional limitation, disability, or handicap. Each survey participant responded to a set of six separate questions about particular disabilities. The National Center for Education Statistics weighted responses to produce national estimates for the student population. (See appendix A Technical Notes.)

Figure 3-2.
Full-time, first-time, first-year enrollment of minority students at 4-year institutions, by sex and race/ethnicity: 1980–1993 (selected years)



See appendix table 3-6.

In 1993 the numbers of men and women enrolled as full-time, first-time, first-year students at 4-year-and-beyond institutions had increased slightly over the previous year, but fewer male foreign students on temporary visas were enrolled. (See appendix table 3-6.) The number of full-time, first-time, first-year Hispanic students at 4-year-and-beyond institutions rose by almost 3 percentage points over the 13-year period to 8 percent of this cohort. The numbers of blacks enrolled for the first time continued to increase in 1993 following some intermediate decreases in the mid-1980s. Black students were 10 percent of first-year students in 1980 and 11 percent in 1993. Although the numbers remain small, some 2,000 more American Indians were in college for the first time in 1993 than 1980.

First-Time, Full-Time College Students

Parents' income and education influence their children's college attendance and success. Studies of first-year, first-time students found that Asian students were more likely than others to have parents with incomes over $100,000 (19 percent had incomes that high), followed by whites (18 percent). (See appendix table 3-7.)[4] It is not surprising that students from these racial groups were most likely to receive financial help from their parents. About 68 percent of white and Asian students received $1,500 or more from parents or relatives, whereas fewer than half of students from underrepresented minorities had such aid. Seventeen percent of first-year students intending science and engineering majors had parents with incomes over $100,000. Only 6 percent of black students, 9 percent of Hispanics, and 11 percent of American Indians had parents with incomes that high. (See appendix table 3-7.) The parents of about 33 percent of black, 26 percent of Hispanic, and 20 percent of American Indian students had incomes under $20,000.

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[4] Every year since 1966, a large sample (for example, in 1994, 237,777 students attending a cross section of 461 universities and 2- and 4-year colleges) of first-time, full-time, first-year students have taken this survey. Survey cosponsor (with the University of California, Los Angeles) the American Council on Education provides an invitation list of some 2,700 postsecondary institutions to the Cooperative Institutional Research Program, which solicits them for information on matriculating students. The data gathered are analyzed and published annually as *The American Freshman*, under the direction of Alexander W. Astin. (In a volume concerned with gender issues, however, most references to beginning college students will prefer "first-year" to Astin's term.)

To be included, postsecondary institutions must pay a fee and poll large numbers of their first-year, full-time, first-time students—4-year colleges need an 85 percent response rate; universities, 75 percent; and 2-year institutions, 40–50 percent. The responses are "weighted to represent the national enrollment patterns of the total 1.5 million first-time, full-time freshmen attending some 2,700 institutions of higher education in 1994" (Henderson 1995a [chapter 3], p. 5).

For reasons not well understood, 2-year schools participate at a much lower rate than baccalaureate- and graduate-level institutions. In 1994, only 24 of 950 2-year schools returned surveys, compared with 437 4-year-and-beyond institutions (personal communication, William S. Korn, 1995). Because of this low response rate, *Women, Minorities, and Persons With Disabilities in Science and Engineering* in general uses only Cooperative Institutional Research Program data on 4-year-and-beyond universities and colleges. When 2-year data are included, a footnote so indicates.

The educational attainment of parents of students from underrepresented groups has increased since 1984. Because favorable home environments tend to lead to better patterns of educational achievement, this seems a hopeful trend.[5] Black students' mothers had the greatest increase in years of formal education. The percentage earning only a high school degree or less decreased from 53 percent in 1984 to 36 percent in 1994. An even greater increase occurred among black students whose mothers had earned a college degree or more. In 1984, that number was 23 percent. By 1994, it had increased to 34 percent, about level with American Indians' students' mothers and well above Hispanics'. White students planning a science and engineering major reported parents with the most extensive educations—over half of their parents had a college degree or higher. The proportion of parents with limited educational backgrounds dropped.

Percentages of students whose parents had college degrees or more also rose. The proportion of Hispanic students whose mothers had baccalaureates or more went from 19 percent in 1984 to 24 percent in 1994; their fathers, from 23 percent to 31 percent. (See appendix table 3-8.) In 1984, 22 percent of black students reported that their fathers had earned baccalaureates or more. That percentage increased to 30 percent in 1994. For these groups, the percentages whose parents had high school diplomas or less dropped: for fathers of black students, the drop was from 60 percent in 1984 to 46 percent in 1994; for fathers of Hispanic students, the drop was from 60 to 51 percent. In 1984, 60 percent of Hispanic students' fathers had no education beyond high school (64 percent reported that their mothers' schooling stopped there also). In 1994, these numbers dropped to 51 percent and 54 percent, respectively.

Grades in high school can be an important predictor of success in college. Full-time, first-year women students were more likely than men to have earned high grades in high school—36 percent of women compared with 26 percent of men have grades of A–A+. (See appendix table 3-7.) Students planning science or engineering majors have higher high school grades than others. Within this group, the women reported higher grades than the men—47 percent of women and 43 percent of men had average grades of A in high school. Although the gender difference in grades persisted, the differences between women and men were less than those among all students.

The pattern of higher grades for women, which prevails overall in college as well as high school, is also evident among science and engineering majors. For example, nearly two-thirds of female mathematics or computer science majors achieved a grade point average of B or higher, compared with fewer than half of the men who majored in those fields. In engineering, a higher percentage of women (63 percent) than men (49 percent) reported a B average or better. By field and by race/ethnicity, the distribution of college grades varied considerably. (For further information, see NSF 1994, p. 50.)

Asians (49 percent) were the most likely to report an A average in high school; blacks (17 percent) were the least likely. About one-third of white, Hispanic, and American Indian students had an average grade of A.

Prospective female first-year mathematics and science majors had taken nearly as much high school mathematics as had their male counterparts in 1994 (98 percent of both genders completed at least 3 years). Women would-be majors, however, still took less physical science and computer science and more biology in high school than their male counterparts. (See appendix table 3-9.)

All racial/ethnic groups also increased the amount of mathematics studies; between 95 percent and 99 percent studied the subject for at least 3 years. In contrast to the pattern in mathematics study, all groups except whites and American Indians took less physical science in 1994 than in 1984. All groups except blacks, however, took more biological science. Asians and whites took less computer science in 1994 than in 1984. By 1994, the percentages of all groups studying computer science almost leveled out. (See appendix table 3-9.)

Choices of major showed distinct differences across gender and racial/ethnic groups; although less in 1994 than 1984, the differences remained. About 31 percent of white first-year students intended science or engineering majors in 1984 and 1994; however, more white women (26 percent compared with 23 percent) and fewer white men (36 percent compared with 40 percent) were choosing those fields than was the case a decade earlier. Fewer first-year Asian students (45 percent compared with 49 percent) planned on science or engineering in 1994 than 10 years earlier; Asians nonetheless remained the racial/ethnic group having the highest proportion so choosing. A greater percentage of blacks intended science and engineering majors in 1994 than 10 years earlier. The percentage of American Indians planning a major in these fields went from 27 percent to 30 percent. (See figure 3-3.)

In all cases, men were more likely than women to plan such majors. More than half of first-year Asian men students (in 1984, 60 percent; in 1994, 53 percent) in comparison to somewhat more than a third of first-year Asian women (37 and 36 percent, respectively) planned science or engineering majors. (See appendix table 3-10.)

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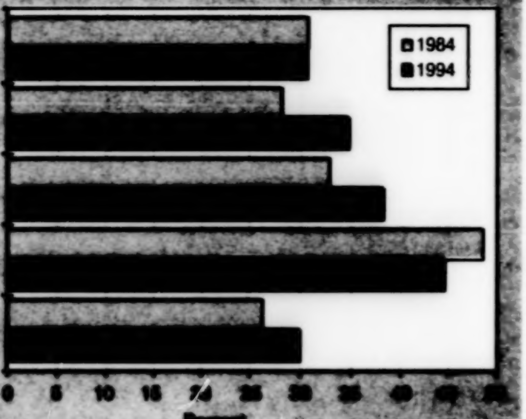
[5] Since 1985, one parent of all doctoral degree earners except American Indians has been likely to have earned an advanced degree as well as a bachelor's (Smith and Tang 1994, p. 101).

Figure 3-3.
Percentage of freshmen who chose science and engineering majors, by race/ethnicity: 1984 and 1994



See appendix table 3-10.

Not all prospective science or engineering majors are committed to careers in those fields. For example, in 1994 under a quarter of first-year students planning a major in science or engineering planned engineering careers; in 1984, nearly a third had chosen engineering. Of the men planning a major in science or engineering, 41 percent in 1984 chose engineering in contrast to 14 percent of the women; in 1994 the percentages had dropped to 35 percent and 11 percent, respectively. And 11 percent of these majors thought in 1984 that they would eventually become computer programmers (5 percent a decade later). The largest percentage of a racial/ethnic group intending an engineering career is Asians (19 and 13 percent in 1984 and 1994, respectively). Among freshmen intending a science and engineering major, 5 percent planned careers as research scientists in 1984, 7 percent in 1994. (See appendix table 3-11.)

About 1 in every 11 entering full-time, first-year students in 1994 reported at least one disability (Henderson 1995a, p. 7).[6] About the same percentage of freshmen with disabilities at baccalaureate-level-and-above institutions chose science and engineering majors as ones without disabilities. Within those fields, the largest percentage of students with disabilities chose the social sciences (over 10 percent); the smallest (under 8) chose engineering. First-year students who planned majors in science or engineering were more likely to have visual impairments than to have other disabilities. (See appendix tables 3-12 and 3-13.) Between 1988 and 1994, more students were claiming learning disabilities both in absolute numbers and as a percentage of the group with disabilities. (See figure 3-4.)

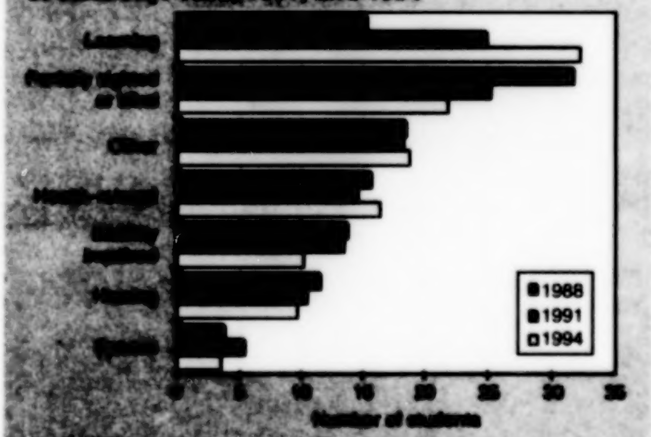
Freshmen with disabilities were more likely to enroll in 2-year colleges (41 percent) than other freshmen (33 percent); the latter were more likely to be found in universities (25 percent) than were students with disabilities (18 percent) (Henderson 1995a). Although the personal and family backgrounds of students with and without disabilities were largely similar, the former tended to be older when they entered college than traditional freshmen enrolling right after high school. Fifty-two percent were male and 42 percent were white men, making both groups overrepresented among students with disabilities.

Disability status of students did not appreciably affect their interest in particular fields. On several other traits, students with disabilities differed from others. Students with disabilities were more likely to see themselves as above average in creativity and stubbornness and less likely to think themselves above average with regard to self-confidence or academic ability. (See figure 3-5.) This pattern of shaky self-esteem among freshmen with disabilities is similar to that reported by Seymour and Hunter (see box on page 32); on the other hand, students with disabilities rated themselves as more creative and artistic than others (Henderson 1995a, p. 24).

The Role of 2-Year Institutions

Two-year institutions often have specialized missions. In pursuit of their role in postsecondary education, most community colleges serve several roles: they prepare students academically to transfer to baccalaureate-level institutions and provide vocational, technical,

Figure 3-4.
Full-time college freshmen with disabilities, by type of disability: 1988, 1991, and 1994



NOTE: Because of multiple responses, percentages may total more than 100 [illegible] are included.

SOURCE: Henderson 1995a, p. 8.

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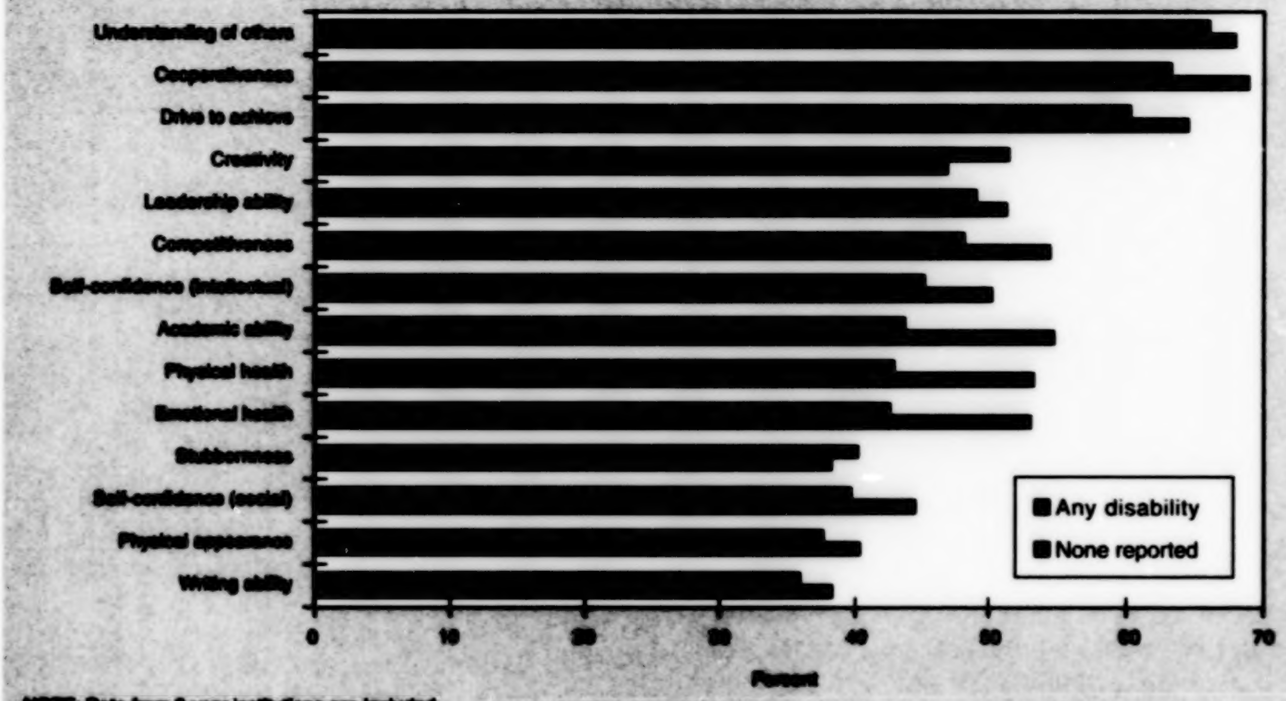
[6] The Cooperative Institutional Research Program, which has asked a question about disabilities on several occasions since 1978 (it now so queries students every other year), asked in 1994 "Do you have a disability? (Mark all that apply.)" The choices were "none, hearing, speech, orthopedic, learning disability, health-related, partially sighted or blind, and other" (Astin et al. 1995, p. 106). (See also footnote 4.)

The fact that more than three times as many students responded affirmatively to this question in 1994 than did in 1978 may reflect different reporting policies rather than indicating a three-fold jump in the population of students with disabilities: "Students who respond to [the disability] question are self-reporting their disabilities.... It is unknown how long the students have lived with their conditions or whether they have been through a formal diagnostic process" (Henderson 1995b, p. 6).

Figure 3-5.
Full-time college freshmen who felt they were above average in ability ratings: 1994



NOTE: Data from 2-year institutions are included.

SOURCE: Henderson 1995a, p. 22.

continuing,[7] and remedial education, as well as offering options for community service.

Community colleges and other associate-level institutions operate in every state and enroll half of the students who begin college in the Nation. Since their origins in the early years of the 20th century, 2-year institutions have played a major role in higher education. Most 4-year-and-beyond colleges and universities admit only students who meet certain academic requirements. Two-year colleges have traditionally exercised less selective admissions policies, thereby providing higher education to students who otherwise might have been excluded. Two-year colleges often serve students who cannot pay high tuition, who have to attend part time, and/or whose high school preparation was inadequate (Cohen and Brawer 1989, p. 14).

About one-fifth of the students who attend a 2-year institution eventually go on to a 4-year college or a university (Adelman 1988). Most associate-level institutions have also assumed a special mission in relation to education in scientific and technical fields (Burton and Celebuski 1994). They find that

•"An estimated 725 of the nation's two-year colleges offer engineering and technology classes. About 500 offer science technology courses."

•About one-fifth of all students in 2-year colleges offering engineering technology are pursuing studies in the field.

•"Two-year colleges emphasized the teaching of applied skills slightly more than they emphasized fundamental science and mathematics in engineering technology" (p. vi).

For information on the relation between professional and technical workers, see Barley (1993).

From 1980 to 1992, both the number and the diversity of students attending 2-year institutions increased substantially. (See figures 3-6 and 3-7.) Despite a slight drop in total and full-time enrollment, community colleges continue to attract large numbers of older and part-time students, as well as women, members of racial/ethnic minority groups, and individuals with disabilities. In 1993, enrollment at 2-year facilities, like that at other postsecondary institutions, slipped slightly. Since 1986, women have been the majority of both total and full-time students in 2-year institutions (in 1993, 58 and 54 percent, respectively). (See appendix table 3-15.) Enrollment in 2-year schools is more prevalent among minorities than whites. More than half of American Indian (54 percent) and Hispanic students (53 percent) attend 2-year colleges compared with 44 percent of all students. (See appendix tables 3-1 and 3-15.)

The attendance patterns of the student populations differ between 2-year and 4-year institutions: 63 percent

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[7] That is, postsecondary study not *necessarily* leading to a traditional baccalaureate.

Patterns Among American Indian Undergraduates

Data on American Indians in higher education may be unreliable because of students who change their declarations of race/ethnicity after they matriculate.[8] About half of the Cooperative Institutional Research Program respondents who identified themselves as American Indians or Alaskan Natives as first-time students switched their ethnic/racial designation to white, non-Hispanic 4 years later (Pavel and Dey research in progress); however, "those who maintained Indian and Native identity had higher grade point averages and were much more likely to receive a degree than those who 'switched'" (Pavel et al. 1995, p. 44).

Of the nearly 122,000 American Indian undergraduates in 1993, 58 percent were women. Some 63,000 went to 2-year colleges; some 59,000, to 4-year-and-beyond institutions. Their dropout rate is high—9 percent of American Indians studying for baccalaureates earned degrees compared with 24 percent of whites and 33 percent of Asians (*The High School and Beyond Senior Cohort Study (1980–1988)*, cited in Wells 1989).

About 14,000 of the American Indians in 2-year institutions enrolled in the tribal colleges that became possible in 1978 with the passage of the Tribally Controlled Community College Act. Nearly all tribal colleges and universities are located near tribal lands, and nearly all are community colleges or technical schools; however, three offer baccalaureate degrees and two, master's degrees. Although each tribal institution is unique, they share certain characteristics:

> Most are governed by boards composed entirely or primarily of American Indians and Alaska Natives; have student bodies that are predominantly American Indian and Alaska Native, and are located in isolated areas.…A primary mission is to reinforce and transmit traditional cultures. All of the institutions offer a practical curriculum geared to contemporary, local needs and are community-service oriented (Pavel et al. 1995, p. 51).

Tribal college graduates earn a mean income of $18,000, much higher than that of the majority of American Indians. About 34 percent of students in tribal colleges eventually transfer to baccalaureate institutions, a number of which offer programs aimed particularly to serve American Indians.

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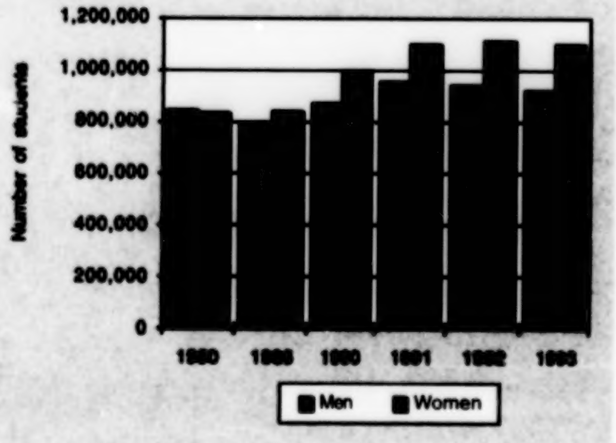
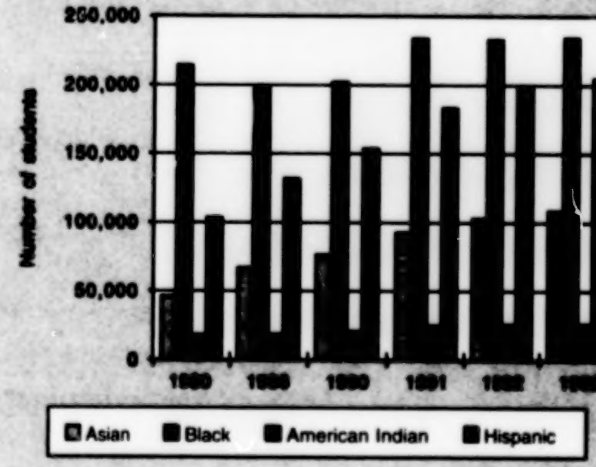
[8] High school and college counselors often encourage applicants to identify themselves as American Indians or Alaskan Natives to increase chances for admission or scholarships (Pavel et al. 1995).

Figure 3-6.
Full-time enrollment at 2-year institutions, by sex: Fall 1980–1993



See appendix table 3-14.

Figure 3-7.
Full-time enrollment at 2-year institutions, by race/ethnicity: Fall 1980–1993



See appendix table 3-14.

in 2-year institutions went part time in 1993, compared with 41 percent in all institutions, and 25 percent in baccalaureate-and-beyond colleges and universities. (See appendix tables 3-5 and 3-15.) Since 1980, the percentage of part-time students has been up slightly in all institutions, in 2-year colleges and in 4-year-and-beyond institutions.

Two-year colleges also play a role in educating many future scientists and engineers. Over a third (39 percent) of the 639,500 total science and engineering graduates in 1991 and 1992 also attended community colleges, and just under a third (30 percent) of that group earned associate degrees. (See appendix table 3-17.) Women baccalaureate graduates were more likely to have attended two-year colleges than men (40 percent as compared with 38 percent). A higher percentage of minority students (39 percent of underrepresented minorities and 48 percent of Asians) than whites (38 percent) went first to community colleges before eventually earning baccalaureates in science and engineering.

Two years after beginning their college or university education, students intending baccalaureates were more likely to have attended continuously than ones aiming for associates. (See appendix table 3-18.) By the end of 2 years, almost half of associate degree seekers had failed to reenroll after an interruption compared to a quarter of would-be baccalaureate dropouts. A greater proportion of black students dropped out of 2-year institutions than did whites or Hispanics, the group with the least attrition at the 2-year level. Most students planning baccalaureates embarked on a continuous enrollment pattern, whereas only one in five students planning associate degrees attended for 2 years without interruption.

After the First 2 Years: Patterns of Students Majoring in Science, Mathematics, and Engineering

College attendance patterns are changing. Only slightly more than half of all enrolled students (both male and female) now follow the formerly traditional pattern of full-time, uninterrupted 4-year attendance (University of Pennsylvania/Institute for Research on Higher Education 1994; NSF 1994, pp. 47–51). Between 47 and 50 percent of students from minority groups follow the continuous pattern, compared with 53 percent of whites.

Students majoring in science or engineering fields are more likely to have followed traditional attendance patterns than students generally, with percentages ranging from over 50 percent to almost 75 percent. Because of their time disadvantage (see box below), many students with disabilities would have liked to attend intermittently; however, financial aid restrictions often mandated full-time attendance.

Students With Disabilities Studying Science, Engineering, and Mathematics: The Time Disadvantage

Many of the problems experienced by persons with disabilities are similar to those of other students in science, mathematics, and engineering; however, the difficulties of the former are [illegible] by what Elaine Seymour and Anne-Barrie Hunter (in press) identify as a shared "disadvantage of time."[9] [illegible] 60 percent of 65 respondents studying at the University of Minnesota's Institute of Technology counted among their difficulties [illegible] issues. These included "problems of [illegible] learning, comprehension, and [illegible] tions in mental and physical functioning; [illegible] [illegible] needs; and time expended in dealing with all types of problems" (p. 173).

"By the start of junior year," write Seymour and Hunter, science, mathematics, and engineering "faculties have (on a national basis) effectively engineered the dropping out of between 40 percent and 60 percent[10] (with variations by discipline) of all freshmen [illegible] larger proportions of women and students of color) who had intended to major in these disciplines" (pp. 75–76).

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[9] Their study, *Talking About Disability: The Education and Work Experiences of Graduates and Undergraduates With Disabilities in Science, Mathematics, and Engineering Majors*, [illegible] experiences through the eyes of 47 males and 18 females at the Institute of Technology (Minneapolis). Seymour and Hunter chose [illegible] (plus a small random sample of recent graduates) at this institution for a number of reasons: among them, students with [illegible] up a high percentage of such individuals compared to those in other [illegible] of engineering; and both the State and the institution have a record of serving individuals with disabilities better than many others. More undergraduates (44) than graduate students (21) were interviewed; [illegible] experiences were similar at both levels.

[10] Percentages based on data from unpublished 1993 Cooperative Institutional Research Program figures (Seymour and Hewitt 1994, [illegible]).

Students With Disabilities Studying Science, Engineering, and Mathematics: The Time Disadvantage *(continued)*

Through data gathered in intensive individual and focus-group interviews, *Talking About Disability* notes, as did an earlier study Seymour coauthored,[11] some of the reasons why many undergraduates drop out of science, mathematics, and engineering majors.

The performance scores and graduation rates, both in terms of percentages finishing and of length of study, of individuals with disabilities are similar to those of other science and engineering students in spite of the first group's frequent in-and-out attendance patterns. Further, students with disabilities had often chosen their majors because of "intrinsic interest"—according to *Talking About Leaving*, "the best predictor of persistence" (p. 21).

Undergraduates with disabilities who chose science and engineering majors found "hostile attitudes of science, mathematics, and engineering faculty" to be their most serious problem. In contrast, "There were only a handful of complaints about [other] faculty, most of whom were reported to be cooperative in following the formal accommodation procedure" (p. 66).

Students with disabilities identified tight finances as their next most serious problem, and the effects of disabilities were *third*. A better understanding of the temporal issues common to students with disabilities could help to alleviate some of the problems raised by both faculty gatekeeping and finances. Respondents believed that

> some of the rules by which funds—especially financial aid—are currently awarded or withheld need to be amended to take into account the kinds of problems which many students with disabilities unavoidably face: the need to progress more slowly in their degree program than some other students; to take time out; and to attend school part-time. Attention to these difficulties will[12] involve changes in financial aid regulations at state and national levels (p. 181).

Similarly, "the apparent difficulties [science, mathematics, and engineering] faculty face in trying to distinguish one form of disability from another, in order to decide whether they should allow some relaxation of the moral rules [calling for impartiality] might be alleviated," if [faculty] could understand disability as "essentially, a disadvantage of time" (p. 177).

Instead, many attempt to distinguish between "acceptable" and "unacceptable" handicaps. By trying to apply what they perceive to be fair rules to all students rather than by attending to *individual* students' needs, science and engineering faculty members sometimes violate institutional provisions for justifiable exceptions.

Seymour and Hunter conclude that "the greatest problems of accommodation appear to be problems of attitude not architecture; not how to adapt facilities or equipement but the willingness to do it" (p. 166). "Treating everyone alike," they continue,

> that is, in a manner which is in line with the prior educational experience of white male students, has unequal consequences for whole groups of students for whom this treatment is unfamiliar and less appropriate, namely, white women, and students of color of both genders.... Students with disabilities inadvertently challenge the traditional system more than any other group by openly asking for suspension of, or exemption from, some of its moral rules (p. 76).

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[11] Seymour and Hewitt, *Talking About Leaving* (1994).

[12] And, many students with disabilities believe, should....

Faculty Teaching Undergraduates

Few women and underrepresented minorities find role models in their science and engineering fields. Among full-time ranked faculty in these fields, women are only 16 percent and blacks, Hispanics, and American Indians combined only 6 percent. (See appendix table 5-27.)

Students Leaving College in General and Science, Mathematics, and Engineering in Particular: Some Causes—And Some Remedies

Persistence is obviously an essential component in successful completion of undergraduate education. Comparisons of 1991 and 1993 enrollment profiles in lower and upper divisions respectively[13] by sex and race/ethnicity, indicate changes in the composition of student groups, changes that would not happen if all groups progressed at identical rates. Although enrollment of all minorities in higher education is up overall, comparison of enrollment by level suggests that underrepresented minorities quit without completing degrees in higher proportions than do white and Asian students. (See appendix tables 3-19 and 3-20.) These figures indicate only general trends, however, and fail to show the important effects of in-and-out or part-time attendance and transfer students. Minority students dropped out between divisions in uneven numbers. Blacks had the highest rate of attrition. Enrollment percentages of white, Asian, and nonresident students rose slightly from lower division (1991) to upper division (1993).

Longitudinal data on science and engineering dropout rates are unavailable, but studies by Seymour and Hewitt, 1994 (see box on page 33), Seymour and Hunter (in press, and see box on page 32), and Steele (1995; see box on page 37) offer some insights on attrition in these fields. Many students who enter college planning to study science, mathematics, and engineering change their plans. An analysis of information from undergraduates on seven college campuses who switched out of such majors—and others who persisted—identified 23 factors influencing such decisions (Seymour and Hewitt 1994). Despite many concerns shared by both men and women, substantial differences by gender suggest that they approach college with different goals and experience their undergraduate education differently.

The students who switched agreed on their top five overall concerns, but men and women differed on the

Text table 3-1.
The top 10 reasons why women switched out of their science and engineering majors and the comparative rankings of men who switched: 1994

	Rank importance among students switching majors		Percentage of students switching majors who cited issue	
	Women	Men	Women	Men
Reasons for choice of science, mathematics, and engineering major prove inappropriate	1	2	91.4	74.2
Poor teaching by science, mathematics, and engineering faculty	2	1	89.2	92.1
Inadequate advising or help with academic problems	3	3	83.9	68.5
Non-science, mathematics, and engineering major offers better education/more interest	4	5	60.2	57.3
Lack of/loss of interest in science, mathematics, and engineering: "turned off by science"	5	4	58.1	61.8
Rejection of science, mathematics, and engineering careers/associated lifestyles	6	11	49.5	37.1
Inadequate high school preparation in basic subjects/study skills	7	8	40.0	41.6
Science, mathematics, and engineering career options not worth effort to get degree	8	7	38.7	48.3
Curriculum overloaded, fast pace overwhelming	9	6	37.6	53.9
Discouraged/lost confidence due to low grades in early years	10	13	36.6	31.5

SOURCE: Seymour and Hewitt 1994, pp. 258–259.

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[13] Lower division students (sometimes called freshmen and sophomores), formally matriculated, have earned fewer than half the number of credits needed to graduate, usually under 60 hours in a 120-hour degree program. Upper division students (sometimes called juniors and seniors) have earned more than half of the necessary credits but have not yet graduated. These categories apply only to baccalaureate students in general and can only suggest changes in the status of particular students.

rank of their importance. Nine out of 10 of those who left science, mathematics, and engineering were concerned about pedagogy; however, men and women defined good teaching differently. Even women with good academic records often felt their academic performances were not "good enough," unless they had a satisfying personal relationship with one or more of their teachers. Unfortunately, such relationships were reported to be rare. (See NSF 1994, p. 46, and text table 3-1 for details.)

Striking differences appear among reasons why students from particular ethnic/racial groups left science, mathematics, and engineering. Minority and majority students differed about their reasons for switching. Students of color tended to blame themselves for switching, whereas white students more often pointed to institutional failures. For example, white students complained of poor teaching and curriculum overload more than twice as often as did minority students. Many minority students reported that they had been "…over-encouraged to enter technical fields for which they were underprepared." These findings suggest a need for better presentation of what science, mathematics, and engineering majors and careers require. (See NSF 1994, p. 48 and text table 3-2.)

Positive Patterns for Women, Underrepresented Minorities, and Students With Disabilities in Science, Mathematics, and Engineering

Some colleges and universities do better at encouraging women, underrepresented minorities, and students with disabilities to enter—and stay—in undergraduate science and engineering programs than others. Helpful for all three groups are active support groups, encouraging professors, and peer and faculty mentors. (See Fuller 1991; Rosser and Kelly 1994; Fort 1995; Stern and Summers 1995.)

Women

Some institutions graduating large numbers of science and engineering women PhDs are also the origin of women's undergraduate degrees in those fields. Universities granting significant numbers of degrees to women in science and engineering fields between 1989 and 1993 at both the undergraduate and doctoral levels include the University of California, Berkeley; Cornell University (Ithaca, New York); the University of

Text table 3-2.
The top 10 reasons why minority undergraduates switched out of their science and engineering majors and the comparative rankings of whites who switched: 1994

	Rank importance among students switching majors		Percentage of students switching majors who cited them	
	Minority	White	Minority	White
Non-science, mathematics, and engineering major offers better education/more interest	1	2	38.5	42.0
Reasons for choice of science, mathematics, and engineering major prove inappropriate	2	15	34.6	6.1
Shift to more appealing non-science, mathematics, and engineering career option	3	6	32.7	22.9
Conceptual difficulties with one or more science, mathematics, and engineering subject(s)	4	16	30.8	5.3
Lack of/loss of interest in science, mathematics, and engineering: "turned off by science"	5	1	28.9	48.9
Rejection of science, mathematics, and engineering careers/associated lifestyles	6	4	26.9	29.8
Inadequate high school preparation in basic subjects/study skills	7	10	25.0	10.7
Discouraged/lost confidence due to low grades in early years	8	6	23.1	22.9
Poor teaching by science, mathematics, and engineering faculty	9	2	21.1	42.0
Curriculum overloaded, fast pace overwhelming	10	3	19.2	41.2

SOURCE: Seymour and Hewitt 1994, p. 373.

Choosing and Leaving Science in Four Highly Selective Institutions

[illegible] of the causes of [illegible] from—the natural [illegible] among 5,320 students [illegible] Cornell University, [illegible] University in 1988 [illegible] of competi- [illegible] gender had little [illegible] in most sci- [illegible] mathematics and [illegible] less success- [illegible] 1996, p. 513, 528). [illegible] science and [illegible] in the *first two* [illegible] was not a fac- [illegible] added).

[illegible] 35 percent of [illegible] of men expressed [illegible] and sci- [illegible], ...gender [illegible] (1996, p. 513). Of the [illegible] science (from a [illegible] the four institutions), [illegible], and smaller pro- [illegible] percent) than men (66 per- [illegible] significant cognitive fac- [illegible] predicting attrition [illegible] lower division science classes. [illegible] women stayed in their biol- [illegible], physics, and chemistry majors as [illegible] "gender added strongly to grades, however, as a factor" leading to high attrition in certain other science fields (p. 513, 528).

Science majors responding to a questionnaire administered in 1991 showed that many of them find the instruction to be "too competitive," to offer "too few opportunities to ask questions," and to be provided by professors who "were relatively unresponsive, not dedicated, and not motivating" (p. 513).

Although most of the students who left science and engineering did so because of the positive attractions of other fields, many criticized the coursework as too hard, the instruction as inferior, and the atmosphere as excessively competitive. Except for the latter perception, women's classroom experiences were rated about as unpleasant as men's.

To encourage more women to enter science, the study recommends providing

- confidence-building exercises such as research assistantships and mentors
- advice to secondary schools as to what preparation is necessary
- "a grading system whereby talented and hard-working science students have at least the same chance of earning decent grades as all other students have" (p. 544)

The researchers also believe one approach to be "counterproductive: Namely, to emphasize the unproven allegation that science faculty are making the lives of women in science especially unpleasant" (p. 544).

Michigan; the University of California, Los Angeles; the University of Illinois at Urbana–Champaign; and the University of Wisconsin, Madison. Joining this group among the top 10 baccalaureate institutions of female science and engineering PhDs during this period were Pennsylvania State University; the University of California, Davis; the University of Maryland; and Rutgers University (New Jersey). (See appendix table 3-21, and for other institutions producing significant numbers of female doctorates in science and engineering, see appendix table 4-25.)

Minorities

Some colleges and universities educate a disproportionately large share of undergraduate members of racial/ethnic minorities. For example, America's historically black colleges and universities[14] continue to play an important role in the production of bachelor's degrees earned by blacks, despite the growing diversity of the Nation's campuses. Hispanics are most likely to attend colleges and universities in regions of the country where they form a large percentage of the population: California, Texas, Florida, and Puerto Rico, cultures where they sometimes are not a minority. (See NSF 1994, pp. 245–246.) And a significant percentage of American Indians also study at institutions in regions of the country where they are concentrated by population:

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[14] Of the more than 150 postsecondary institutions founded during the years of legal segregation, 106 were open in 1994. Located largely in southern and border states, most offer baccalaureates—19 provide associate degrees only and a handful, graduate awards (Trent and Hill 1994).

A Burden of Suspicion: How Stereotypes Shape the Intellectual Identities and Performance of Women and Blacks

Claude M. Steele's research on the "troubling lack of persistence of women in advanced quantitative fields and the underperformance of African Americans in schooling more generally" (1995, p. 2) has led to his theory of "stereotype threat" and "disidentification" [illegible] [illegible] [illegible] of these academic failings.

Steele defines stereotype threat as "apprehension over possibly self-fulfilling negative stereotypes about one's group or about being judged" in their terms (p. 2). He summarizes, "This threat amounts to a jeopardy of double devaluation: Once for whatever bad thing the stereotype-fitting behavior or feature would say about anyone, and again for its confirmation of the bad things alleged in the stereotype" (p. 12). His research shows that taking difficult standardized tests in subject areas in which their abilities are "negatively stereotyped" can threaten able women and blacks, and that this can "dramatically depress their performance" (p. 2).

Laboring under such negative stereotypes can "frequently cause school disidentification"—that is, women and/or blacks can drop out and/or refuse to internalize subjects they think the majority expects them to fail. Notes Steele,

> I did this with the baritone horn in the eighth grade. After the band instructor told me, as I was going on stage with the band, that I could hold the horn but that I didn't have to play [it], I began to realign my self-view so that competence on that horn would not be an important basis of my self-esteem. I looked for other identities.... This natural process of identity formation and change can be pushed into use as a defense against the glare of stereotype threat. It is, of course a costly defense,... [which may] undermine the capacity for self-motivation that is part of having an identified relation to a domain (p. 4).

Steele elaborates through reference to William James's description of the development of the self as a process of picking from the many possible those "on which to stake one's salvation" (cited in Steele in press). Once a self has been identified with, overall esteem "becomes hostage to it in that success in the domain makes one happy." To illustrate, James admitted he would be "sad to learn that someone knew more psychology than he, but that he could 'wallow in the grossest ignorance of Greek'" (cited in Steele in press).

Steele and his colleagues support their theories about stereotype threat and disidentification with regard to women and mathematics through studying the conditions under which men and women took the same difficult test. "Women performed worse than men when they were told that the test produced gender differences... but they performed equal to men when the test was represented as insensitive to gender differences. With Joshua Aronson, Steele experimented with black and white students on another single test, also difficult, of verbal ability. When the test was presented as a test of intellectual ability, blacks responded by underperforming. When it was said to be "ability nondiagnostic"—as a problem-solving task unrelated to ability—black and white performance was equal (p. 22). In another test, when blacks were asked to list their race, they again underperformed whites; the two groups' performance was about equal when the race question was not asked.

Studies and programs designed by Steele and others show that "wise" educational environments (p. 39) can overcome both stereotype threat and disidentification. Stressing that "stigmatization is situation-specific, less something that marks a person across all situations than something that—stemming from specific negative stereotypes—devalues groups in specific situations," Steele recommends

- optimistic student-teacher relationships
- nonjudgmental responsiveness
- imputing ability
- challenge, not remediation
- stressing intelligence's expandability
- group study

Following these principles, Steele and his colleagues implemented a program at the University of Michigan that reversed most of the underachievement patterns and high dropout rates of black first-year students. Concludes Steele:

> Predicaments like [stereotype threat and disidentification] can be treated, intervened upon, and it is in this respect that I hope the perspective taken in this analysis offers hope, and some early evidence, that solutions to these problems may be closer than we have recognized (p. 38).

Oklahoma, California, and Texas. (See NSF 1994, pp. 249–251.)

Thirty percent of the black students who received bachelor's degrees in science and engineering in 1993 earned them at historically black colleges and universities, up slightly from 29 percent in 1985. (See appendix table 3-22.) Engineering was responsible for most of the gain. The fraction of engineering degrees to blacks from historically black colleges and universities increased from 22 percent in 1985 to 27 percent in 1993. Change varied across fields: in physical sciences, the percentage of blacks earning bachelor's degrees at historically black colleges and universities rose between these years from 44 to 47 percent, whereas in mathematics the percentage fell slightly from 50 to 48 percent.

"The 80 [historically black colleges and universities] which award bachelor's degrees in science and engineering are a small proportion of the total number of institutions in this country which award [such degrees], yet they play a prominent role in educating African-American scientists and engineers" (Trent and Hill 1994, p. 72). Between 1986 and 1988, historically black colleges and universities were the baccalaureate-level institutions of 29 percent of blacks earning doctorates (p. 77).

Students With Disabilities

Undergraduates with disabilities attend colleges and universities of all types in all parts of the country. Some enroll at disability-specific institutions or ones with programs designed particularly to assist students with a particular disability. The only dedicated, federally funded institutions serving persons with particular disabilities are two institutions for deaf and hard-of-hearing stu-

Minorities in Science at Four Highly Selective Institutions

Another study of science and engineering majors[15] at the four highly selective institutions considered in the box on page 36, this time focusing on non-Asian minorities—except for American Indians—finds that, unlike women, minorities are "*at least* as interested in pursuing science as whites" (Elliott et al. 1995, p. 1). The researchers conclude that "the chief problems for non-Asian minority students aspiring to science majors would appear to be not institutional racism, but rather a relative lack of preparation and developed ability" (p. 40).

"Despite relative deficits in scores on measures of preparation and developed ability, blacks entered college with strong interest in majoring in science," they write (p. ii). Blacks had the highest attrition (66 percent), however; whites and Hispanics were near the average of 40 percent; Asians were lowest (30 percent). The researchers also found that ethnicity "did not add significantly to ability and achievement variables in predicting attrition," and they uncovered "almost no evidence of any sense of racial or ethnic discrimination" (p. ii).

Responses of students originally intending a science and engineering major suggest that ethnicity did make a difference, however, in a number of areas, including background, budgeting of time, reasons for attrition, and attitudes toward the academic environments of their majors. "If equal developed ability predicts equal persistence, unequal developed ability predicts differential persistence," and whites and Asians typically have better science and mathematics preparation than underrepresented minorities (p. 4). "Hispanics appear to have persisted more, and blacks less, than [high school test scores and science grades] might have indicated" (p. 13). Still, "preadmission variables accounted for a significant fraction of the variance of persistence decisions, and ethnicity did not" (p. 13).

"The gap in developed ability between the white-Asian majority and non-Asian minorities, especially blacks, especially in science, results from institutional policies of preferential admissions from pools differing in measures of…achievement at the point of entry into higher education" (p. 35). Underrepresented minority students may decide that the cost, however serious, is worth the education they receive. But selective majority white institutions could usefully assist underprepared minority students in a number of ways, including

- offering voluntary intensive mathematics and science courses to students interested in science with Scholastic Aptitude Test mathematics scores below a certain level
- encouraging during this period the growth of a community
- linking students with mentors
- providing internships
- and—as for women—encouraging group study and providing advice to high schools about what preparation is necessary.

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[15] The sample was 3,534 whites, 582 Asians, 355 blacks, and 216 Hispanics enrolled in 1988. Researchers excluded American Indians from the analysis because of the small numbers involved—of the 34 matriculating, only 9 expressed an initial interest in science.

dents—Gallaudet University (Washington, D.C.) and the National Technical Institute for the Deaf (New York). Both receive substantial Federal funding; the U.S. Government also supports four programs for deaf and hard-of-hearing students within postsecondary institutions serving all students.[16] About half of the Nation's undergraduate institutions, however, enrolled at least one student who self-identified as deaf or hard of hearing between 1989 and 1993 (U.S. Department of Education, National Center for Education Statistics 1994).

At all educational levels, students with disabilities may request and can receive accommodative support from individuals, programs, offices, policies, and equipment designed to give them equal access to educational opportunity. A number of colleges and universities advertise assistance to students with learning disabilities, the fastest growing group among students with disabilities, to enable them to learn in regular campus curriculums.[17]

Supportive educational environments comprising help and encouragement from family members, friends, teachers, other persons with disabilities—mentors, advocates, and advisers—are the "most important factors encouraging students with disabilities to progress in science and engineering (or any field)."[18] Nonetheless, recent strides forward in assistive technology, which often break down centuries-old barriers to access, "have really exploded in certain fields. Perhaps the most important of all has been the computer. People with disabilities who previously might have been unable to be active in certain disciplines now can—because computer literacy is bound to be involved somewhere" (Stern, quoted in Timpane 1995, p. 1796).

Not only is technology improving assistive devices for individuals with disabilities, but also recent legislation, particularly the Technology Act of 1988 (reauthorized in 1995), has increased access to such technology. (See appendix A Technical Notes on "Information on Persons With Disabilities" and appendix table 1-1.)

The Opposite of Attrition: Switchers *Into* Science and Engineering

Although many adolescents *lose* interest in science, mathematics, and engineering after the sophomore year in high school, data also indicate that a significant number *switch into* those fields during their undergraduate years. Analysis of longitudinal data examining interest and enrollment over time show that:

> Nearly 60 percent of those who eventually went on to major in [science, mathematics, and engineering] had no plans to do so when they were high school sophomores. Indeed, nearly as many students decided to major in [science, mathematics, and engineering] after their sophomore year of college as stayed with a decision to major in [these fields] as high school sophomores. This finding suggests that educators concerned about the development of scientists, mathematicians, and engineers for the future need to look to other fields and help smooth the transition of students from one major to another (NSF 1993, p. 13).

More men immigrate into science fields than do women, according to Strenta et al. (1994). Ninety-five women and 165 men switched into science between 1988 and 1992 at the four highly selective institutions they studied (p. 525). The recruits are often strong students: they "averaged 3.24 in their science courses during the first two years, while students who were initially interested in but left science had a corresponding average of 2.63" (p. 526).

Graduation: Degrees

Associate Degrees and Certificates

Associate degrees offer one measure of completion for courses of study below the baccalaureate. All higher education institutions may award associate degrees; however, they usually complete courses of study only in 2-year colleges, and many students who do preliminary work there choose to transfer to baccalaureate-and-above institutions without earning degrees. Hence, dropout rates for 2-year institutions often lack the significance of attrition before the baccalaureate—failure to reenroll may mark an educational transition forward rather than a loss.

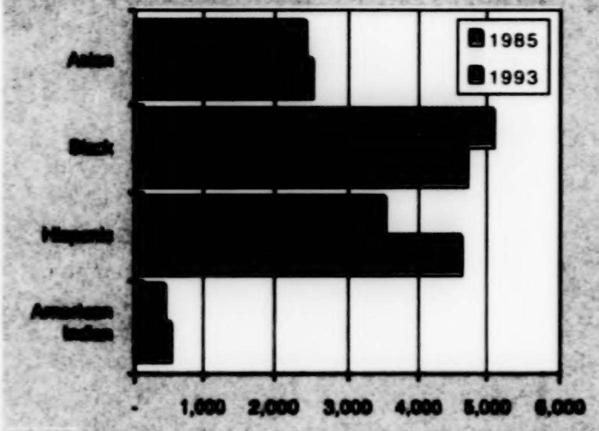
More than a third of the students who eventually go into science and engineering fields begin their education in 2-year colleges. (See appendix table 3-17.) Just under a third of these students in 2-year colleges transfer after earning an associate degree; more than two-thirds go on without one. The number of students earning associate degrees in science and engineering fields declined between 1985 and 1993; over 16,000 fewer degrees were awarded in 1993. American Indians, however, con-

[16] Gallaudet enrolls students at all undergraduate and graduate levels, whereas the students at the National Technical Institute for the Deaf can earn certificates, diplomas, or associate degrees, often then transferring to its enfolding university, the Rochester Institute of Technology, or elsewhere for baccalaureate and/or graduate study. In addition, a number of institutions provide special programs for deaf and hard-of-hearing students: the California State University at Northridge has federally funded programs at all degree levels; the Postsecondary Education Consortium (Tennessee) offers undergraduate degrees and below; the Seattle Community College (Washington) and the St. Paul Technical College (Minnesota) give associate degrees.

[17] College directories list many institutions with programs to enable such students to participate in regular coursework. (See, for example, Mangrum and Strichart 1994, and Kravets and Wax 1995.)

[18] Virginia W. Stern, Director of the American Association for the Advancement of Science Project on Science, Technology, and Disability (Washington, D.C.), personal communication, 25 October 1995.

Figure 3-8.
Associate degrees to minorities in science and engineering, by race/ethnicity: 1985 and 1993



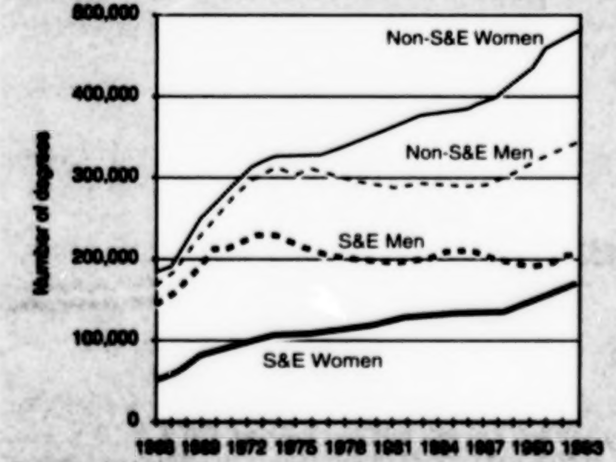
See appendix table 3-23.

tinued to earn an increasing number of associate degrees. (See appendix table 3-23 and figure 3-8.)

In 1993, underrepresented minorities earned 9,900 associate degrees in science and engineering (16 percent), up from 9,076 in 1985 (12 percent). (See appendix table 3-23.) They were more highly represented in some fields than in others. In the two fields awarding 77 percent of the science and engineering associate degrees, however—computer science and engineering technology—they earned only 22 percent and 14 percent, respectively.

Women made up almost 47 percent of students earning associate degrees in 1993, excluding engineering technology (the most populous science field at this level). Including the 38,473 degrees in engineering technology, women's representation sinks to 25 percent. Minority women tended to follow the pattern for all women, but percentages are higher for those underrepresented.

Figure 3-9.
Bachelor's degrees in science and engineering (S&E) fields and in non-S&E fields, by sex: 1966–1993



See appendix table 3-24.

Baccalaureate Degrees

In 1993, 1,179,278 bachelor's degrees were awarded in all fields. Women received more than half of the total number, as they have since 1982. (See appendix table 3-24.) Their share has continued to increase; by 1993, women earned 641,742 bachelor's degrees (or over 54 percent). Of the total baccalaureate degrees awarded that year, 31 percent were in science and engineering fields. (See appendix table 3-25.) In those fields *combined*, women earned 45 percent of the bachelor's degrees granted in 1993, up from 25 percent in 1966. (See appendix table 3-24 and figure 3-9.) In the combined science fields *alone*, however, women earned more than half the degrees (51 percent).

In most science and engineering fields, the fraction of degrees going to women increased between 1983 and 1993; however, women earned fewer than half the bachelor's degrees in all these fields except in psychology—where their representation went from 68 percent in 1983 to 73 percent in 1993—sociology (68 percent) in 1993, and biological science (52 percent). (See appendix table 3-26.)

The proportion of women declined between 1983 and 1993 in three fields. The proportion of women earning bachelor's degrees in computer science decreased from 36 percent in 1983 to 28 percent in 1993; in economics, the percentages slipped from 32 to 30; and in sociology, the percentages decreased from 70 to 68. On the other hand, women went from 12 percent of the oceanography degrees in 1983 to 27 percent 10 years later. Women earned more baccalaureates in mathematical sciences than in 1983 but fewer in computer sciences.

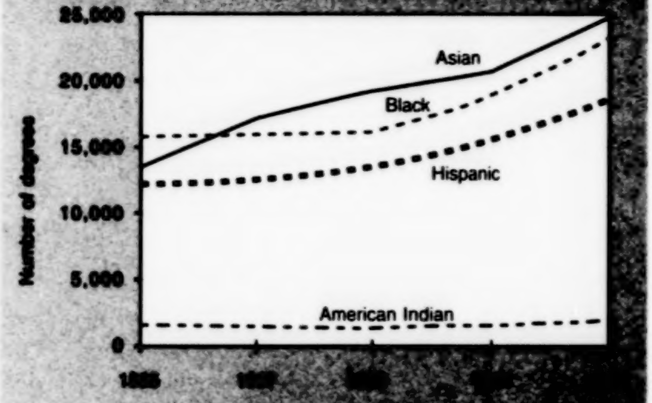
Women earned low but growing proportions of engineering degrees (going from 13 percent to 16 percent over the decade) and earth, atmospheric, and oceanic sciences (from over a quarter to under a third of the field). (See appendix table 3-25.) For men, on the other hand, engineering was the second most popular field, trailing social sciences in number of degrees awarded. Women made the biggest gains in chemical engineering (from 21 percent to 32 percent) and in civil engineering (from 14 percent to 18 percent). (See appendix table 3-26.)

In 1993, U.S. citizens and foreign students on permanent visas earned 1,122,276 bachelor's degrees. Underrepresented minorities earned roughly 12 percent of all bachelor's degrees, the same percentage they earned in science and engineering combined. The number of degrees awarded to blacks, Hispanics, and American Indians has been rising. (See figure 3-10.) In 1993, underrepresented minorities earned 41 percent more bachelor's degrees in nonscience and engineering fields than in 1985. The proportion rose faster in science and engineering—they earned 47 percent more degrees than they did 8 years earlier.

In the last decade, although all minorities have steadily increased their share of bachelor's degrees in science and engineering,[19] important differences *among* groups and, by gender, *within* minorities are evident. (See text table 3-3 and appendix table 3-28.) Although Asians' share of bachelor's degrees was greater than their proportion in the population, blacks, Hispanics, and American Indians continued to be underrepresented. Asians, who constitute 3 percent of the population according to Census Bureau data, earned 7 percent of science and engineering baccalaureates in 1993. Blacks (about 12 percent of the population) also earned 7 percent of the degrees.

In 1993, women earned 108,958 more baccalaureates than men (5 percent), and they also earned the majority of degrees in science fields. Underrepresented minority women continued to earn more degrees than black, Hispanic, and American Indian men. So few minority women earned engineering degrees, however, that they remained underrepresented among students achieving baccalaureates in science *and* engineering combined.

Figure 3-10.
Bachelor's degrees in [illegible] engineering fields, by [illegible]



NOTE: Data are for U.S. citizens and [illegible]
See appendix table 3-27.

Text table 3-3.
Percentage of science and engineering bachelor's degrees earned by women, by race/ethnicity—U.S. citizens and foreign students on permanent visas only, [illegible]

Race/ethnicity	All baccalaureates	Science and engineering	Science	[illegible]
All students	55	45	51	[illegible]
White	54	44	49	[illegible]
Asian	51	42	50	[illegible]
Black	63	59	62	[illegible]
Hispanic	59	50	55	[illegible]
American Indian	57	51	54	[illegible]

See appendix table 3-28.

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[19] NSF reports race/ethnicity of bachelor's degree recipients only for students who are U.S. citizens or foreign students on permanent visas. Discussions here of degree awards, therefore, will also use this group as the reference group. Because at the master's and doctoral levels, the number of awards to foreign citizens is substantial, numerically and proportionately, establishing comparable comparison groups across degree levels is important.

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CHAPTER 4

BEYOND THE BACCALAUREATE IN SCIENCE AND ENGINEERING

Graduate Enrollment Across the Board

Graduate education constitutes a critical step in the preparation of all scholars and professionals, including scientists and engineers. During this time of focused study, choices become firmer and the broad knowledge gained at earlier levels deepens and often narrows. Graduate education in the United States sets a world standard. Not only is it highly regarded by students in this country, but also the numbers of students from abroad coming to study here—particularly in science and engineering fields—testify to its esteem worldwide.

Graduate school enrollment[1] in this Nation increased in all disciplines by more than 22 percent during the 1980s (NSF 1994). Total full- and part-time graduate enrollment rose in all fields by an average of 2 percent per year between 1986 and 1993; the number of women increased faster than the number of men (see figure 4-1) (Syverson and Maguire 1995, p. 23).[2]

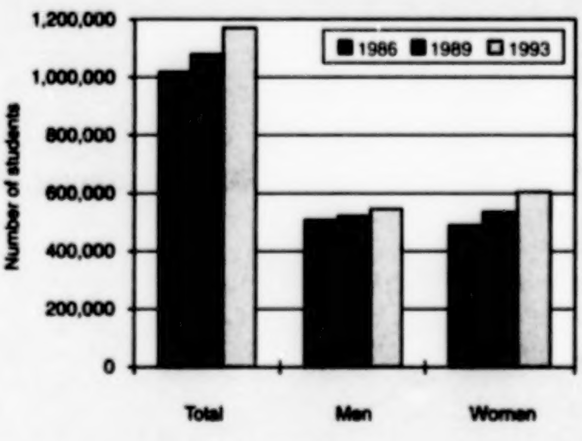
The overall growth during those 7 years in graduate enrollment occurred in all fields reported; however, the nonscience areas of engineering, business, and public administration lost students between 1992 and 1993 (Syverson and Maguire 1995, p. 27).

In addition, student composition in all disciplines became more diverse. Enough more women enrolled that, by the middle of the 1980s, they were a majority among graduate students (NSF 1994, p. 61). More women than men were studying in all fields in 1993 except engineering, business, and the biological and physical sciences (Syverson and Maguire 1995, p. 4). Business and education enroll the largest number of graduate students, accounting for 14 and 20 percent of 1993 enrollment, respectively. That year, 62 percent of the students in business were men, and 73 percent of those in education were women (Syverson and Maguire 1995, p. 4–5).

Graduate enrollment grew consistently but not steadily across most fields and within most racial/ethnic groups between 1986 and 1993 (Syverson and Maguire 1995, p. 31). In 1993, minorities were about 16 percent of graduate enrollment in all fields (see figure 4-2). Almost one-half of Asian graduate students with U.S. citizenship or permanent visas were enrolled in science and engineering programs, compared with about one-fourth or less of black, Hispanic, or American Indian graduate students (Syverson and Maguire 1995, p. 30). Students of different racial/ethnic groups varied widely in their choice of fields of study. Education is the most popular field for all U.S. graduate students except for Asians (Syverson and Maguire 1995, p. 13).

Women registered gains over the last decade in both graduate enrollment and degrees, however, and underrepresented racial/ethnic minorities made limited progress. Among minorities with U.S. citizenship, blacks were best represented, accounting for 42 percent of minority graduate enrollment. Hispanic enrollment was slightly lower than Asian. More women than men from underrepresented minorities were enrolled in graduate school; nearly twice as many black women attended as black men (Syverson and Maguire 1995, p. 11).

Figure 4-1.
Trends in graduate enrollment, 1986–1993



SOURCE: Syverson and Maguire 1995, p. 25.

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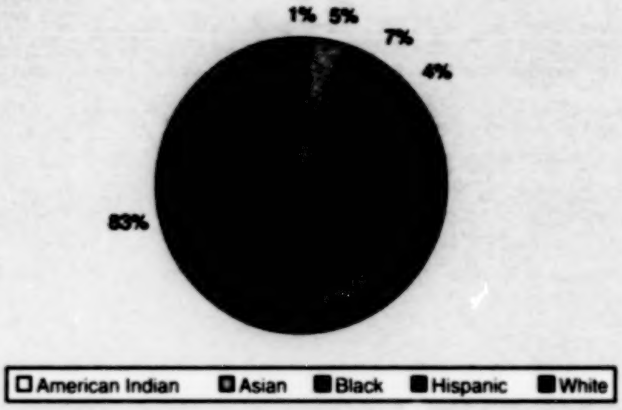
[1] Unless otherwise noted, data come from National Science Foundation (NSF) universe surveys, including all higher education institutions offering graduate programs. NSF makes imputations for nonresponse.

[2] The Council of Graduate Schools (in 1995, Peter D. Syverson and Moira J. Maguire) annually summarizes data gathered on a survey it sends with the Graduate Record Examinations Board to the some 650 graduate schools that have membership in the council or its regional associations. About 600 reply. The responding institutions enroll about 75 percent of the Nation's master's candidates and more than 90 percent of the doctoral students (citizens and foreign students alike) (personal communication, Syverson, October 24, 1995).

Figure 4-2.
Percentage of graduate students, by race/ethnicity: Fall 1993



NOTE: Data are for U.S. citizens and permanent residents only.

SOURCE: Syverson and Maguire 1995, p. 10.

Progress in baccalaureate enrollment has been slower in science and engineering fields for women, blacks, Hispanics, and American Indians than in graduate study overall. All these groups except American Indians earned more science and engineering doctoral degrees in 1993 than in 1986; Asians increased their degree earning by 97 percent compared to the 18 percent more doctorates awarded to all U.S. citizens and permanent residents. (See appendix table 4-26.) Graduate students with disabilities enrolled in science and engineering programs (though not in engineering itself) at a rate similar to their proportion in the post baccalaureate population as a whole. (See appendix table 4-4.)

Graduate Students: Some Characteristics

Financing Graduate School

Financial support during graduate school is often crucial. Study for graduate degrees can be expensive, and few students and/or their families can foot the bills on their own. Although this report breaks out some separate data for master's degrees, only in engineering are master's degrees sometimes terminal,[3] serving in the sciences mostly as way stations to the doctorate.

Students receiving U.S. doctorates support themselves and their studies through teaching and research assistantships, through "other" sources of support, and through funds of "unknown" origin. See appendix tables 4-1–4-3, which report only on *primary* sources of maintenance (not combinations). When listing such sources, few recipients cited institutional assistantships. Students of both sexes, from all races and ethnicities, U.S. citizens or not—77 percent of those with disabilities, 69 percent of those without, 75 percent of U.S. citizens, and 71 percent of graduates from all citizenship groups—support their doctoral studies through other sources. The exception is students in the physical sciences, slightly more than half of whom are primarily supported by their work for their institutions.

About the same percentage of men and women studying for their doctorates supported themselves primarily through teaching assistantships (12 percent and 11 percent, respectively). These percentages were slightly higher for doctoral recipients in science and engineering than for recipients in all fields: 12 percent of the 17,647 men and 13 percent of the 7,537 women. A greater percentage of men than women received most of their funding through research assistantships, both in science and engineering and in other fields. (See appendix table 4-1.) Students earning nonscience and engineering doctorates (37 percent of those awarded) were less likely to be supported primarily by research assistantships (about 4 percent) than those in science and engineering (28 percent of the men and 20 percent of the women). At the high end, almost 39 percent of all engineering doctorates and 37 percent of the physical sciences doctorates were primarily supported by research assistantships.

Doctoral students' reliance on teaching and research assistantships varied according to their citizenship, racial/ethnic, and disability status. (See appendix tables 4-2 and 4-3.) In all fields, students with disabilities received financial and need-based aid about as often as did others. (See appendix table 4-4.) Just over a tenth of recipients of U.S. doctorates awarded in science and engineering are supported mainly from teaching assistantships—the low is 3 percent (agriculture) and the high, 31 percent (mathematical and computer sciences).

Some racial/ethnic groups of U.S. citizens receiving science and engineering doctorates were more likely than others to cite assistantships as their major support (appendix table 4-2). Eleven percent of whites received teaching assistantships, compared to 10 percent of American Indians, 9 percent of Hispanics, 8 percent of Asians, and 6 percent of blacks. Research assistantships, which can be an important aspect of science and engineering training, were cited as primary support by 32 percent of Asians, 23 percent of whites, 17 percent of Hispanics, 15 percent of American Indians, and 9 percent of blacks earning doctorates in those fields.

Doctorate recipients with disabilities from all citizenship groups were less likely to have received assistantships of either sort than students without disabilities. In all fields, recipients with disabilities reported smaller percentages of teaching (9 percent compared with 12 percent) and research assistantships (13 percent compared with 19 percent) than other students. The differences were similar in science and engineering fields with regard to both kinds of assistantships. Within specific science and engineering fields, however, the picture was less consistent: students with disabilities reported higher percentages of research assistantships in physical, mathematical and computer sciences, biology, and the social sciences than other students; they did similarly well in teaching assistantships in physical science and engineering. (See appendix table 4-3.)

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[3] In 1994, of 1,494 accredited engineering programs in over 300 institutions, 1,463 were accredited at the bachelor's ("basic") level and 31 at the master's ("advanced") level (Accreditation Board for Engineering, 1994, p. 47). Doctoral programs are not accredited.

Graduate Students' Attendance Patterns: Full- or Part-Time?

Largely because of the high cost of graduate school, many students choose to, or have no alternative but to, attend part time. Because of what Seymour and Hunter (in press) call the "disadvantage of time," the 4 percent of graduate students who have disabilities are less likely to attend graduate school full time and are more likely to attend several institutions than other students. (See box on page 32, chapter 3, and appendix table 4-4.) Although students with disabilities were slightly more likely to attend part time than others, they chose all fields at about the same rate as other students.

It is unsurprising that different kinds of doctorates take different kinds of students different amounts of time to earn. (See appendix table 4-5.) Students from all fields needed a median 10.5 years to move from their baccalaureates to their terminal degrees. These figures were less for the science and engineering fields (9.1 years) and more for all other fields (15.7 years). Although the median time between bachelor's and doctorates for women was more than for men (12.2 compared to 9.9 years for all terminal degrees and 17.0 compared to 14.2 years for nonscience and engineering fields), both sexes finished their science and engineering degrees in about 9 years. Doctoral recipients with disabilities took longer to complete their degrees than others. (See appendix table 4-32.)

Students in all fields were registered for a median 7.1 years between baccalaureate and doctoral degrees. Although the median time was less in science and engineering, some variation by field occurs. Students earned their doctorates faster in chemistry than any other science and engineering field, spending just under 6 years in study after their bachelor's. Women, spending just over 5½ years, were quicker than men, who took slightly fewer than 6.[4]

[4] A study of doctoral graduates from nine of the University of California campuses between 1980 and 1988 bears out these patterns and adds analysis by racial/ethnic groups (Nerad 1991). Among its findings:

- Having dependents lengthened the time for completion of the doctorate.
- Having fellowships, loans, or assistantships shortened dramatically the time necessary.
- Relying on one's own resources increased completion time by 2.7 years for Asians, 2.8 years for whites, and 2.4 years for underrepresented minorities.

Pluses and Minuses for Women Graduate Students in Physics

In 1993, graduate and undergraduate physics students provided information on the educational environment of physics departments nationwide (Curtin et al. 1995).[5] In addition, physics professionals conducted site visits to find ways to improve the climate for women in physics departments (Dresselhaus et al. 1995).[6] This project found "that the existing climate for women in physics departments adversely impacts their progress in attaining satisfactory career goals,…identified a number of factors that create a poor climate,…[and] suggested ways to address them and remove them" (p. 20). Among the problems is women's serious underrepresentation on physics faculties. (See text table 4-1.)

Graduate and undergraduate physics students[7] reported that only about one-third of the students said their departments encouraged self-confidence, and U.S. women rated them lowest in this area.

- **Although over 60 percent of U.S. men reported collegial relationships with their advisors, just over half of U.S. females and male foreigners (and only 39 percent of foreign women) felt they were treated as colleagues.**
- **About 8 of 10 U.S. physics graduate students would go into the field again; fewer foreign students would do so—6 of 10 women and 7 of 10 men.**
- **Females are more likely than men to belong to study groups. (Curtin et al. 1995).**
- **Only about one third of the students said their departments encouraged self-confidence, and U.S. women rated them lowest in this area.**

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[5] The American Physical Society and the American Association of Physics Teachers, in collaboration with the American Institute of Physics, sent a questionnaire to 1,955 graduate students in physics. The sample drew from all women studying physics at the postbaccalaureate level (2,042 of them, foreign) and 2 of 11 men. The response rate was 60 percent (Curtin et al. 1995).

[6] Representatives of the American Physical Society and the American Association of Physics Teachers visited 15 campuses (10 of the visits were funded by the NSF) (Dresselhaus et al. 1995).

[7] Undergraduates were also surveyed, but the researchers found that the results might be unreliable because of problems with the sample frame and the questionnaire instrument.

Pluses and Minuses for Women Graduate Students in Physics *(continued)*

Text table 4-1.
Academic rank by gender in PhD-granting physics departments, 1985[a] and 1994[b]

	Women			Men	
	N	Percent at rank	Percent of total at rank	N	Percent at rank
1985					
Full professor	44	33	2	2,832	63
Associate professor	23	17	3	793	18
Assistant professor	33	25	7	467	10
Other ranks	33	25	7	420	9
Total	133	100	3	4,512	100
1994					
Full professor	72	31	3	2,695	60
Associate professor	60	26	7	757	17
Assistant professor	60	26	10	532	12
Other ranks	37	16	7	533	12
Total	229	100	5	4,517	100

[a] Data from the 161 PhD-granting physics departments 1982–1983 through 1986–1987.
[b] Data from 175 of the 183 PhD-granting physics departments 1993–1994.

SOURCE: Dresselhaus et al. 1995, p. 3.

Citizenship Issues

U.S. universities occupy a position of world leadership in science and engineering doctoral education, awarding degrees to a diverse racial/ethnic group of citizens and foreign students. In 1992, whites constituted only 21 percent of the doctoral recipients who were non-U.S. citizens on temporary visas, whereas they were 88 percent of the U.S. citizens (NSF 1994, pp. 78–79). Noncitizens make up about 21 percent of the science and engineering graduate students and 33 percent of the engineers. (See appendix table 4-13.) They earned 42 percent of the doctorates in science and engineering (and 61 percent of those in engineering). (See appendix tables 4-1 and 4-2.) Data on race/ethnicity for science and engineering graduate students are available only for U.S. citizens, and—sometimes—foreign students on permanent visas; data on gender are available for all students.[8]

Women

Enrollment

Of the total of 438,052 graduate students enrolled in science and engineering fields in 1993, 157,493 were women. (See appendix tables 4-6 to 4-8.)

The percentage of women in these combined fields has grown steadily though slowly over the past few years, from just over 32 percent in 1988 to 36 percent in 1993. (See figure 4-3.) In science fields (excluding engineering), 44 percent of the graduate students in 1993 were women, up from 40 percent in 1988. (See figure 4-3.) Although women's representation also improved in engineering—from 13 to 15 percent—women were most outnumbered there. Women continued to dominate psychology (70 percent) and several subfields in the social and biological sciences. (See figure 4-4.)

Women doing graduate work in science and engineering were only slightly more likely to attend part time than men, nearly closing the gap evident in 1982, when 63 percent of women, compared to 66 percent of men, attended full time. Under a third of all students in science went part time in 1993, compared to over a third in engineering. Sixty-six percent of women and 71 percent of men attended their science graduate classes on a full-time basis. (See appendix table 4-9.) These percentages have changed very little over the last 10 years. In 1982, 62 percent of the female graduate engineering students and 60 percent of the men were enrolled full time. (See NSF 1994, p. 63.) The few graduate students studying astronomy were most likely to be enrolled full time.

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[8] Discussions of racial/ethnic groups here as elsewhere in this report are limited to data on U.S. citizens, with the exception of doctoral statistics. The latter sometimes include foreign nationals on permanent or temporary visas.

Foreign Graduate Students: Stayers and Leavers

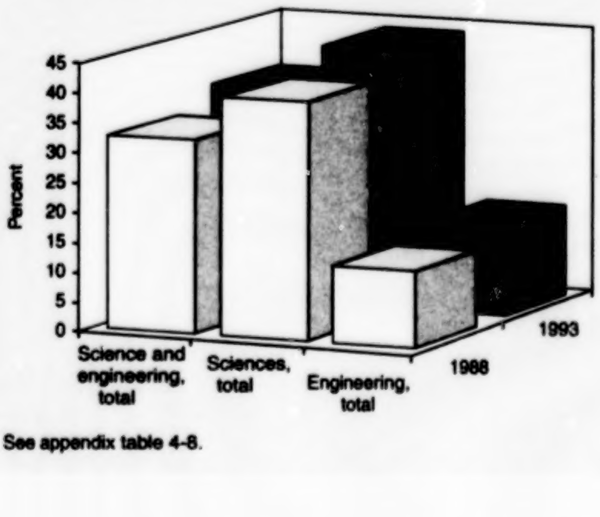
Of foreign students who graduated with science or engineering doctorates in 1984, fewer than half remained in the United States in 1992[9] (Finn et al. 1995). About 41–42 percent of students on temporary visas (48–49 percent of those on all visas) were still working in the United States 8 years after earning their doctorates. The study also found that "stay rates" varied by

- field—engineering had the most stayers and social and life sciences the most leavers.
- country of origin—many students from India, the People's Republic of China, and Iran stayed, and many from Korea, Japan, and Brazil, left.

They found no significant variation by

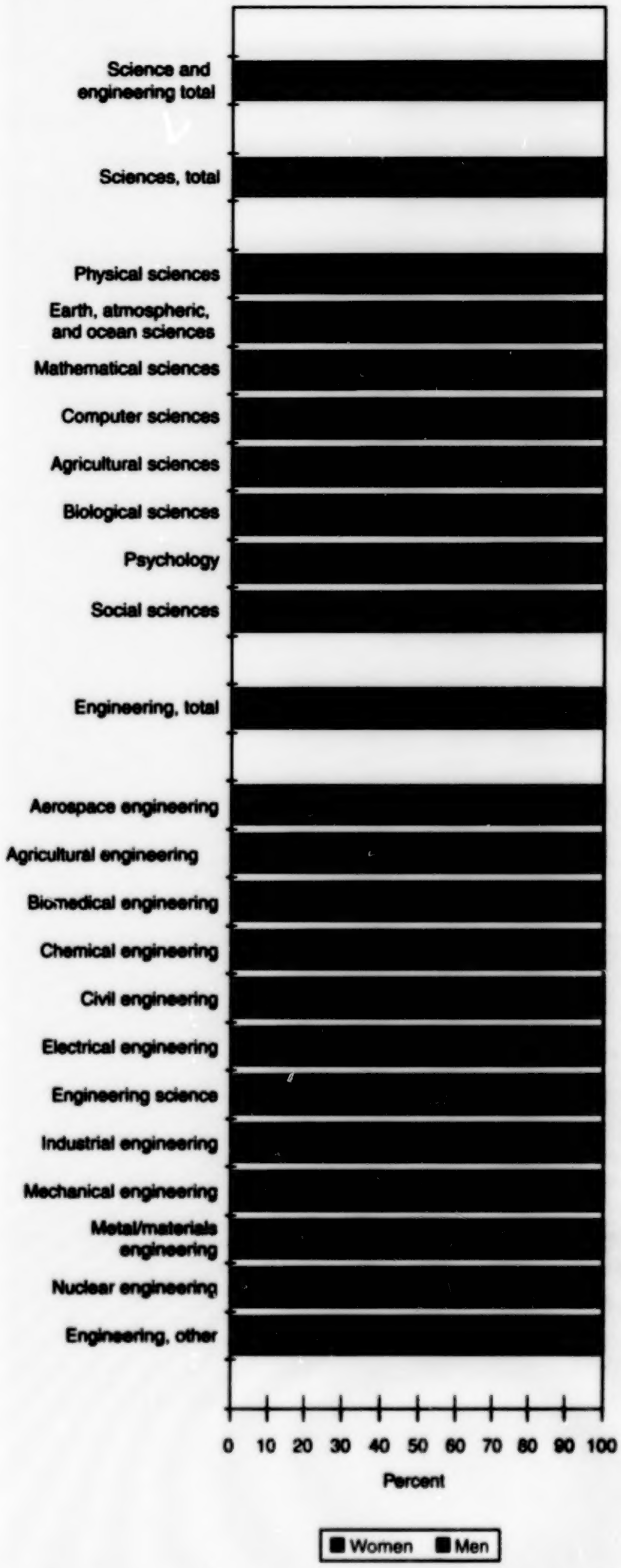
- salary or
- prestige of departments where students earned doctorates.

Figure 4-3.
Women as a percentage of science and engineering graduate students, by broad area of study: Fall 1988 and 1993



See appendix table 4-8.

Figure 4-4.
Percentage of science and engineering graduate students, by field and sex: Fall 1993



See appendix tables 4-7 and 4-8.

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[9] The study used social security numbers to match doctoral graduates from abroad with U.S. earnings. If the Social Security Administration did not find evidence of an individual's having earned at least $5,000 in employment covered by social security, the researchers classified him or her as a "leaver." They made adjustments, however, to take into account individuals working in jobs not covered by social security.

Choice of Field

In 1993, female graduate students were considerably more likely to be enrolled in fields other than science and engineering than were men (Syverson and Maguire 1995, p. 4). Women were the majority in all other fields except business—ranging from 77 percent in the health fields to 55 percent in the humanities and arts.

Women's representation in science and engineering varied greatly by field. (See appendix tables 4-6 to 4-8.) In psychology, more than two-thirds of the graduate students in 1993 were women. Women were also in the majority in biometry/epidemiology, genetics, nutrition, and several social science fields. By contrast, only 14 percent of the graduate students in physics were women.

Among the engineering fields, the highest proportion of female graduate students in 1993 was in biomedical engineering, over one-fourth. This field was followed by chemical and civil engineering, each with a female enrollment of about 20 percent; metallurgical/materials engineering and industrial engineering/management science each enrolled about 19 percent women. At the other extreme, under 10 percent of the graduate students in the mechanical and aerospace engineering fields were women.

Where They Study

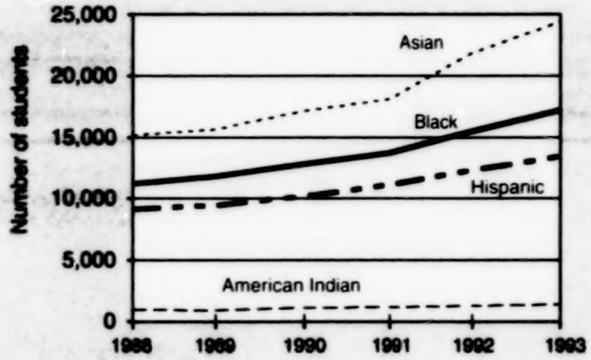
Fifteen of the 20 universities enrolling the most women graduate students in science and engineering in 1993 were large state research institutions. The University of Minnesota (all campuses) enrolled the most women (2,000), followed by the University of Wisconsin (all campuses) (1,777). The private institution enrolling the most women was George Washington University (Washington, D.C.) (1,567). (See appendix table 4-11.)

Minorities

Enrollment

Of the 332,525 U.S. citizens enrolled in graduate science and engineering programs in 1993 (both full and part time), 31,945, or 10 percent, were underrepresented minorities.[10] For blacks, the increase in graduate science and engineering enrollment from 1988 to 1993 was from 4 to 5 percent; for Hispanics the increase was from 3 to 4 percent; and American Indians remained under half a percentage point. Asians increased from 5 to 7 percent over those years. In 1993, whites and Asians made up 85 percent of the total enrollment. (See appendix table 4-12 and figure 4-5.)

Figure 4-5.
Minority graduate students in science and engineering, by race/ethnicity: Fall 1988–1993



NOTE: U.S. citizens only

See appendix table 4-12.

Choice of Field

The field choices of graduate students vary considerably by gender and among racial/ethnic groups. For example, 37 percent of Asian science and engineering graduate students were enrolled in engineering fields, compared with 22 percent of whites, 20 percent of Hispanics, 16 percent of American Indians, and 15 percent of blacks. (See figure 4-6.)

The 3,759 Asians enrolled in electrical engineering—almost 11 percent of all graduate students in this field—largely accounted for the heavy concentration of Asians in engineering.

Conversely, 37 percent of all black graduate students in science and engineering were in social science fields, compared with 30 percent of American Indians and 30 percent of Hispanics, but only 12 percent of Asians. Similarly, only 6 percent of the Asian students (and 2 percent of noncitizens) were studying psychology, whereas psychology students represented 17 percent to 22 percent of the total number of science and engineering graduate students from all other racial/ethnic groups.

Where They Study

The growing numbers[11] of members of minority racial/ethnic groups are differentially distributed around the country. Over 80 percent of blacks lived in metropolitan areas in 1990 (U.S. Department of Commerce 1993c), whereas nearly 9 of 10 Hispanics were concentrated in 10 states, mostly in the South and West (U.S.

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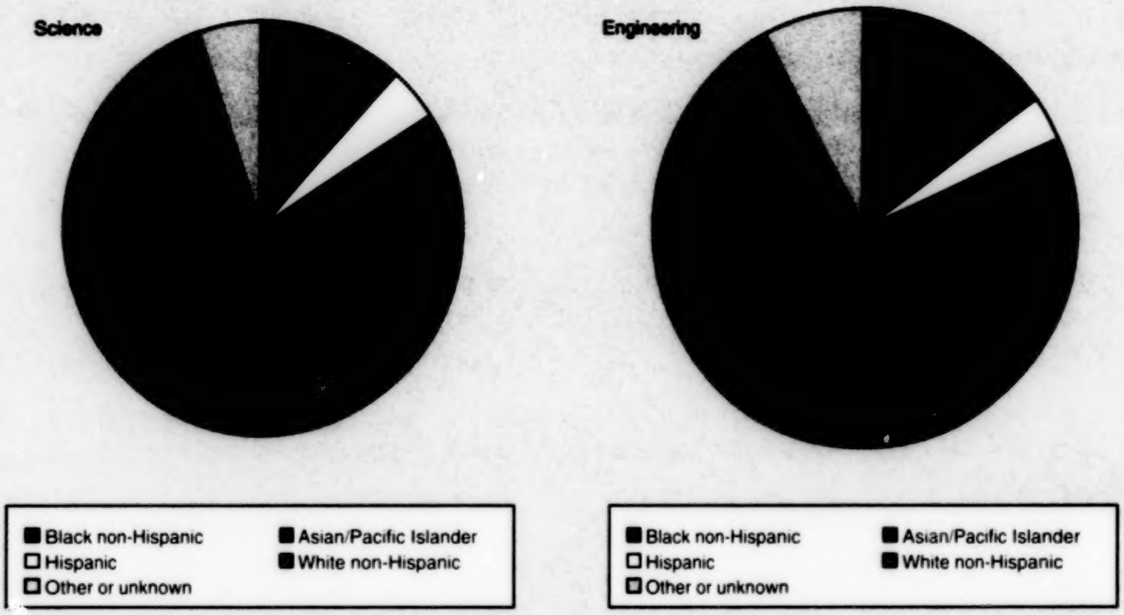
[10] Better reporting of race/ethnicity, evidenced by declines in the numbers of students of "unknown race/ethnicity," could account for significant portions of the increase among underrepresented minorities. These increases may, therefore, reflect improvements in statistical quality rather than actual change.

[11] The 1990 census counted nearly 30 million blacks, an increase of about 4 million (1 percent) from 1980. The Hispanic population grew by 53 percent during those years. Both the numbers of Asians and Pacific Islanders and their percentage among groups in the U.S. population nearly doubled during that decade (from 3.7 to 7.3 million) (U.S. Department of Commerce 1993b, 1993c, 1993d, 1993e).

Figure 4-6.
Percentage distribution of graduate students in science and engineering, by race/ethnicity: Fall 1993



NOTE: U.S. citizens only.

See appendix table 4-13.

Department of Commerce 1993e). Asians and Pacific Islanders also live mainly in the West (U.S. Department of Commerce 1993b, 1993e); so do American Indians, more than half of whom live in six states (Oklahoma, California, Arizona, New Mexico, Alaska, and Washington) (U.S. Department of Commerce 1993d). Graduate students are also regionally concentrated. Minorities—including Asians—made up more than one-fifth of total graduate science and engineering enrollment in Mississippi, California, the District of Columbia, Georgia, and Louisiana. (See appendix tables 4-14–4-17 and NSF 1994, pp. 295–298.) Such students are enrolled in just over 80 percent of the institutions offering graduate programs, 539 out of 665. The top 10 institutions enrolled 15 percent of all minority graduate science and engineering students; the top 20 enrolled 24 percent. (See NSF 1994, p. 69.)

Blacks

In 1993, three historically black colleges and universities were among the 10 institutions with the largest proportions of black science and engineering graduate students. (See appendix table 4-15 and text table 4-2.) The 10 institutions with the highest black enrollment accounted for 15 percent of all black graduate students in science and engineering fields, a proportion that has remained fairly steady for a decade.

The 25 historically black colleges and universities offering science and engineering graduate programs (4 percent of the 615 institutions offering master's in science and engineering) in 1989 awarded one in five such degrees earned by blacks. Only four historically black colleges and universities award doctoral degrees in science and engineering (Trent and Hill 1994, p. 77).

Hispanics

Eleven of the 50 universities that enrolled the most Hispanic graduate students were members of the Hispanic Association of Colleges and Universities. About a fifth of all Hispanic graduate students in science and engineering fields attended member institutions in both 1988 and 1993. Thirty-nine of the 50 institutions enrolling large numbers of Hispanic graduate students were located in the South, West, and Southeast, or in large urban centers such as New York or Los Angeles, where many Hispanics live. The 10 institutions with the highest Hispanic enrollment accounted for 22 percent of all Hispanic graduate students in science and engineering in the United States. Puerto Rican colleges and universities enrolled 13 percent of all Hispanic graduate

Text table 4-2.
The top 10 universities enrolling Asian, black, Hispanic, and American Indian graduate students in science and engineering: 1993

Academic institution	Number of graduate students
Asian	
San Jose State University	730
University of Southern California	656
University of California–Los Angeles	619
University of Houston	577
Stanford University	501
University of California–Berkeley	423
California State University–Long Beach	366
Polytechnic University	359
University of Illinois at Urbana–Champaign	340
Massachusetts Institute of Technology	329
Black	
Howard University	444
Chicago State University	351
Clark Atlanta University	275
Georgia Institute of Technology, all campuses	258
University of Michigan, all campuses	237
Jackson State University	217
New York University	214
Long Island University, all campuses	197
George Washington University	194
University of Maryland at College Park	186
Hispanic	
University of Puerto Rico–Rio Piedras campus	1,093
University of Puerto Rico–Mayaguez campus	345
Florida International University	248
University of California-Berkeley	198
University of Southern California	189
Texas A&M University, all campuses	183
Center for Advanced Studies on Puerto Rico and Caribbean	178
University of New Mexico, all campuses	172
University of Texas at Austin	168
University of Texas at El Paso	166
American Indian	
University of Oklahoma, all campuses	45
Northern Arizona University	33
Northeastern State University	26
University of Colorado, all campuses	25
Oklahoma State University, all campuses	25
Harvard University	23
Cornell University, all campuses	22
University of Arizona	21
University of Minnesota, all campuses	20
University of Washington	18

See appendix tables 4-14 to 4-17.

students in science and engineering fields. (See appendix table 4-16.) In 1992, Puerto Rico had the highest percentage of U.S. citizen minority graduates enrolled in science and engineering, 91 percent, virtually all Hispanic (NSF 1994, pp. 295–296).[12]

American Indians

American Indians tended to concentrate their graduate study in science and engineering in the Southwest, and a fifth attended the 10 institutions with the highest American Indian enrollment. More American Indians enroll in graduate programs in California, the state having the second largest population of American Indians in the Nation, than in any other state. (See appendix table 4-17.)

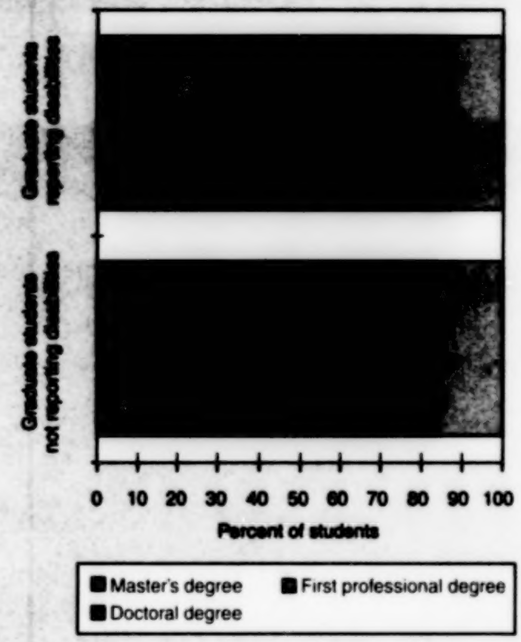
Asians

Some 13,000 Asians enrolled at the 50 universities having the most Asian graduate students in 1993. In comparison, about 15,400 underrepresented minorities attended the top 50 (in terms of concentrated enrollment) institutions for their respective groups. Seven of the top 10 universities, enrolling 3,872 of the top 10's 4,900 Asian graduate students, were in the western United States, where their population is concentrated. (See appendix table 4-14.)

Students With Disabilities

Four percent of postbaccalaureate students (including those planning master's, doctoral, and first-professional degrees) in 1993 reported a disability (Henderson 1995a, 1995b).[13] Proportionately, they are underrepresented compared with their 20 percent presence in the U.S. population. (See chapter 1.) Most graduate students with disabilities attended universities designed to serve all students.[14] Graduate students with disabilities had similar degree aspirations to others (see figure 4-7), and students with and without disabilities gravitated toward similar fields—the three most popular were education, social behavior, and business/management. (See appendix table 4-18.)

Figure 4-7.
Degree aspirations of graduate students reporting disabilities



SOURCE: Henderson 1995a, p. 3.

Like undergraduates with disabilities, graduates with disabilities were more likely to be veterans than other students (Henderson 1995b, p. 7). And, because incidence of disability increases with age—persons over 70 *without* disabilities are in a minority group (Davies 1992, analyzing Kraus and Stoddard 1989)—students with disabilities at all postsecondary levels were more likely to be older than others.

Graduate students with disabilities—like all such Americans—benefited from dramatic improvements in assistive technology. The situation for individuals with disabilities in the 1990s, in contrast to their condition only two decades ago, is vastly improved:

> Then, precollege education was open to some students with disabilities but certainly not all. At the postsecondary level, individual professors and administrators were sometimes supportive, but there were no national or campus policies to make programs accessible. Science and engineering programs, with strong components of

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[12] Through a special agreement between the Puerto Rican Planning Board designated by the governor as liaison to the Census Bureau, the U.S. Census has not asked a question about race in Puerto Rico since 1950 (personal communication, Lourdes Nieves Flaim, Census Bureau, October, 1995). The 1990 Census, however, asked whether respondents could speak Spanish and English (and, if English, with how much ease or difficulty). Ninety-eight percent of respondents said they could speak Spanish; 51 percent said they didn't speak English (U.S. Department of Commerce, Bureau of the Census 1993a). Thus, Hispanic students in Puerto Rico are part of the majority ethnic culture.

[13] Henderson's analysis is based on data from the U.S. Department of Education, National Center for Education Statistics, National Postsecondary Student Aid Study, 1992–1993. Respondents to this telephone survey, which did not provide telecommunications devices and therefore might underreport data for individuals who are deaf or hard-of-hearing, were undergraduate, graduate, and first-professional students. Among the questions probing demographic and enrollment characteristics was one inquiring if respondents had a "functional limitation, disability, or handicap." Each survey participant answering affirmatively then faced a set of six separate questions about particular disabilities. The National Center for Education Statistics weights responses to produce national estimates for the student population. See appendix A Technical Notes for more information.

[14] Most universities and colleges strive to support individuals with disabilities through special campus programs and offices. Gallaudet University (Washington, D.C.) enrolls large numbers of deaf and hard-of-hearing students in several of its graduate programs, which also admit other students; the California State University at Northridge also serves this special population within its regular curriculums. Undergraduates who are deaf and hard-of-hearing, however, can choose to enroll in a number of postsecondary institutions designed to serve them. (See chapter 3.)

> laboratory and field work, presented countless barriers...(Stern and Summers 1995).

In addition, professional scientific conferences and museums were often inaccessible, and "science employment was possible but often limited" (p. vi). Assistive technology was often both ineffective and underpublicized. By now stereotypes about the limitations of persons with disabilities in science ought to disappear in the face of "closer investigation" that confirms "that pursuit of intellectual interests can surpass any limitation of physical or sensory function" (Stern and Summers 1995, p. vi). However, this is still not the case.

Outcomes: Master's, Doctorates, and Postdoctorates in Science and Engineering

Degrees marking the formal outcomes of graduate education are important credentials for those pursuing science and engineering careers. Data on these outcomes provide benchmarks for measuring the progress of population groups in increasing their representation.

Graduate education has expanded significantly during the past 25 years. The overall trends in degree awards document the pattern of growth: for about 10 years, from approximately the mid-1960s until the mid-1970s, growth was sustained and rapid. From that point forward, increases occurred, but they were slower, limited to certain discipline areas, or marked by interim periods of decline.

One hundred and sixty-four percent more master's degrees were awarded in 1993 than 1966; the percentage of doctorates went up by 121 percent during those years. The number of master's degrees awarded in science and engineering fields rose more slowly than others—by 110 percent—whereas doctoral awards increased at about the same rate in both these broad fields and all disciplines.

Periods of expansion generally offer environments in which barriers may fall or ease. Although change has in fact occurred, during the last 25 years, the magnitudes of increases for underrepresented groups are strikingly different and in many instances do not approach the level of growth overall. The variety of factors influencing the outcomes for different groups makes generalizations difficult.

The proportion of women earning graduate science and engineering degrees has increased substantially, although it lags behind their presence in other fields, in which women earn more degrees than men at both the master's and doctoral levels (60 percent of master's degrees and 52 percent of doctorates). Generally, women have increased their earning of science and engineering graduate degrees, while men's substantial majority of such degrees has declined slightly. In 1993, women's numbers had improved to 36 percent of the master's and 30 percent of the doctorates; these figures were substantially different from 1966, when women earned 13 percent of science and engineering master's degrees and 8 percent of such doctorates. When graduate degrees in all fields are counted, however, although men earned fewer than half the master's, they earned 62 percent of the doctorates (contrast 1966, when men took 66 percent of the master's and 88 percent of the doctorates). (See appendix table 4-19.)

Participation varies across racial/ethnic groups as well as by degree level. Over the last decade, however, increases occurred in total degree awards across all disciplines to members of all groups. In 1966, women earned 47,588 master's degrees (34 percent of those awarded) and 2,086 doctorates (12 percent). By 1993, those numbers had climbed to 201,220 (54 percent) and 15,108 (38 percent).

Master's Degrees

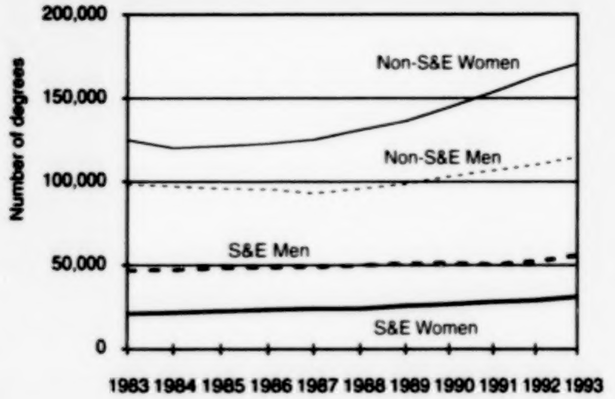
Women

Women earned over half of the 370,973 master's degrees awarded in all fields in 1993. (See appendix tables 4-20 and 4-22.) They first received a majority of all master's degrees in 1981, earning more than half the nonscience and engineering degrees since 1975 (NSF 1994, p. 74). (See appendix table 4-19.) In science and engineering fields, both the number of women earning master's degrees and their percentage of the total have risen steadily, increasing in the last 10 years to 30,971 (36 percent of degrees awarded). In contrast, the number of science and engineering degree awards to men reached a high in 1977, then bottomed out in 1981; in 1990, the number climbed above the 1977 level and has continued upward since then.

Women's master's awards varied by field. In the science fields excluding engineering, women steadily increased their share. By 1993, women accounted for 46 percent of science master's degrees, up from 39 percent a decade earlier. Among the science fields, women were most heavily represented in psychology, earning almost 72 percent of the master's degrees in 1993, up from 61 percent in 1983; biological/agricultural sciences (46 percent in 1993, 38 percent in 1983); and social sciences (almost 47 percent in 1993). Men were most overrepresented in earth, atmospheric, and ocean sciences (72 percent of the degrees) and the physical sciences (70 percent).

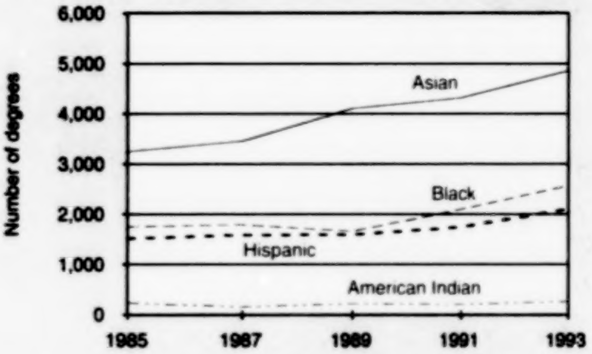
Women continued to be seriously underrepresented among engineering master's degrees. Their percentage of master's degrees overall did increase, however, from 9 percent in 1983 to 15 percent in 1993. (See figures 4-8 and 4-9.)

Figure 4-8.
Master's degrees awarded in science and engineering (S&E) fields and in non-S&E fields, by sex: 1983–1993



See appendix table 4-20.

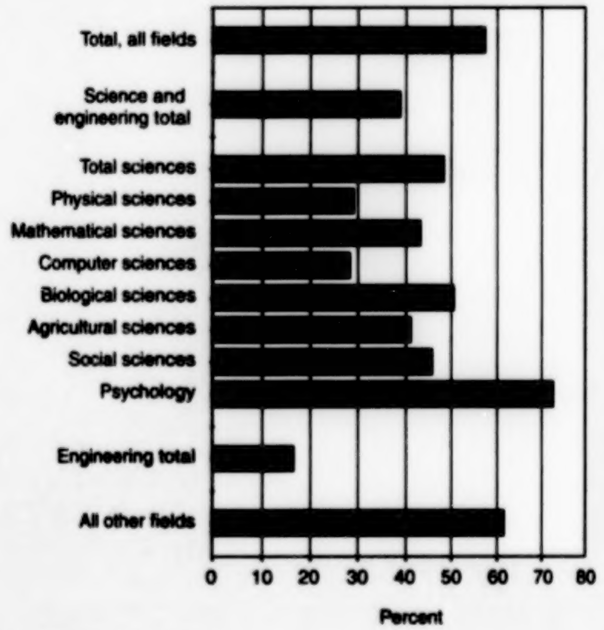
Figure 4-10.
Master's degrees awarded to minorities in science and engineering fields, by race/ethnicity: 1985–1993 (selected years)



NOTE: U.S. citizens and permanent residents only.

See appendix table 4-21.

Figure 4-9.
Percentage of master's degrees awarded to women, by field: 1993



See appendix table 4-20.

Minorities

In 1993, U.S. citizens and permanent residents earned 81 percent of their master's degrees in fields other than science and engineering. Members of underrepresented minority groups earned 4,899 science and engineering master's degrees in 1993; Asians, 4,846 (each making up about 8 percent of the total master's awarded in those fields). This was an increase for both groups, both in absolute numbers and proportions of the total: blacks, Hispanics, and American Indians together earned 7 percent in 1985, and Asians, about 6 percent. (See figure 4-10.)

Despite uneven growth during the last decade, some science and engineering disciplines granted substantially higher numbers of master's degrees. Different racial/ethnic groups gained at different rates—Asians earned 48 percent more master's degrees than in 1985; blacks, 47 percent; Hispanics, 38 percent; American Indians, 11 percent; and whites, 9 percent. (See appendix table 4-21.)

Asians

Asian predominance among master's degree holders in engineering was more marked than in the combined fields. In 1985, Asians earned 11 percent of such degrees, compared with 5 percent for underrepresented minorities. In 1993, Asians held 13 percent, compared with 7 percent for blacks, Hispanics, and American Indians.

The science and engineering field with the largest number of awards at the master's degree level for all racial/ethnic groups except for Asians was social science; they earned only 3 percent of those degrees. Asians earned the highest proportion of all degrees in computer science (18 percent), followed by engineering (13 percent). (See appendix table 4-22.)

The gains were especially striking in computer science, in which Asians' proportion of all such degrees went up from 12 percent in 1985 to 18 percent in 1993, an 80 percent increase.

Blacks

Numbers of science and engineering master's degrees awarded to blacks continued to climb since 1989, growing by 47 percent between 1985 and 1993, with the greatest increases occurring in recent years. In 1993, blacks earned 18,897 master's degrees in all fields, just over 6 percent of the total, a proportion that has remained relatively stable over the past 8 years. The biggest gains were in mathematical science (84 percent) and computer science and engineering (71 percent in each field).

Hispanics

The overall growth trend for Hispanics earning master's degrees in science and engineering was similar to that for blacks, and second only to Asians. Hispanics earned 2,092 science and engineering master's degrees in 1993, 4 percent of the total, up 578 from 1985, when they held 3 percent of the total. In 1993, Hispanics earned over 11,000 master's degrees in all fields, almost 4 percent of the total.

American Indians

The few American Indians earning master's degrees—1,344 in 1993, considerably less than 1 percent of total degrees awarded—makes comparisons and generalizations difficult. Only 253 American Indians earned master's degrees in science and engineering in 1993; this figure was up slightly from 228 in 1985.

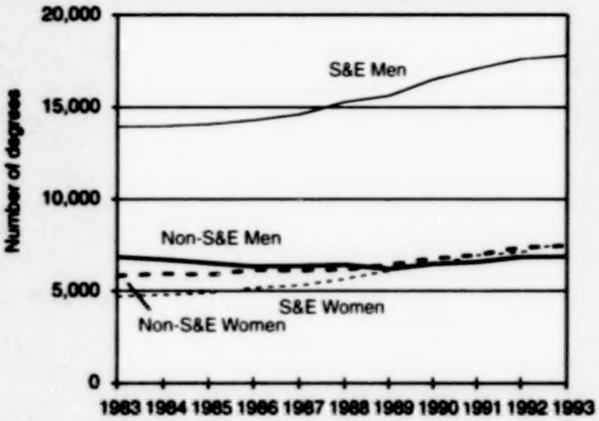
Doctorates

Of the nearly 40,000 doctorates awarded in the United States in 1993, about two-thirds went to U.S. citizens and students on permanent visas, an increase from the over 25,000 awarded in 1983. Students from other nations and those of unknown citizenship status earned over 11,000 doctoral degrees that year. The percentage of students from abroad was higher in science and engineering than their presence in the general population of those receiving doctorates. Of the more than 25,000 doctorates awarded here in 1993 in science and engineering, 58 percent went to citizens and permanent residents. Over 60 percent of doctorates in engineering went to students from other nations and those of unknown citizenship status. Underrepresented U.S. minorities earned 8 percent of the total doctorates awarded to U.S. citizens, up from about 6 percent of the total in 1983. (See appendix tables 4-26 and 4-27.)

Women

Women in all citizenship groups earned 15,108 of the 39,754 doctorates awarded in all fields in 1993, 38 percent of the total. (See appendix tables 4-23 and 4-24.)

Figure 4-11.
Doctoral degrees awarded in science and engineering fields and in non-S&E fields, by sex: 1983–1993



See appendix table 4-23.

In fields other than science and engineering, women earned 52 percent of the doctorates awarded in 1993, up from 46 percent in 1983. The number of doctoral degrees in science and engineering awarded to women increased from 4,624 (4,500 science and 124 engineering) in 1983 to 7,537 in 1993 (7,016 and 521)—63 percent more degrees in 1993. (See figure 4-11.)

Important differences marked trends in science and engineering fields. Although the number of women earning doctorates in engineering remained small, it was over four times their total in 1983 and in terms of percentages of all engineering degrees awarded, was nearly double the 1992 percentage. (See appendix table 4-23 and text table 4-3.)

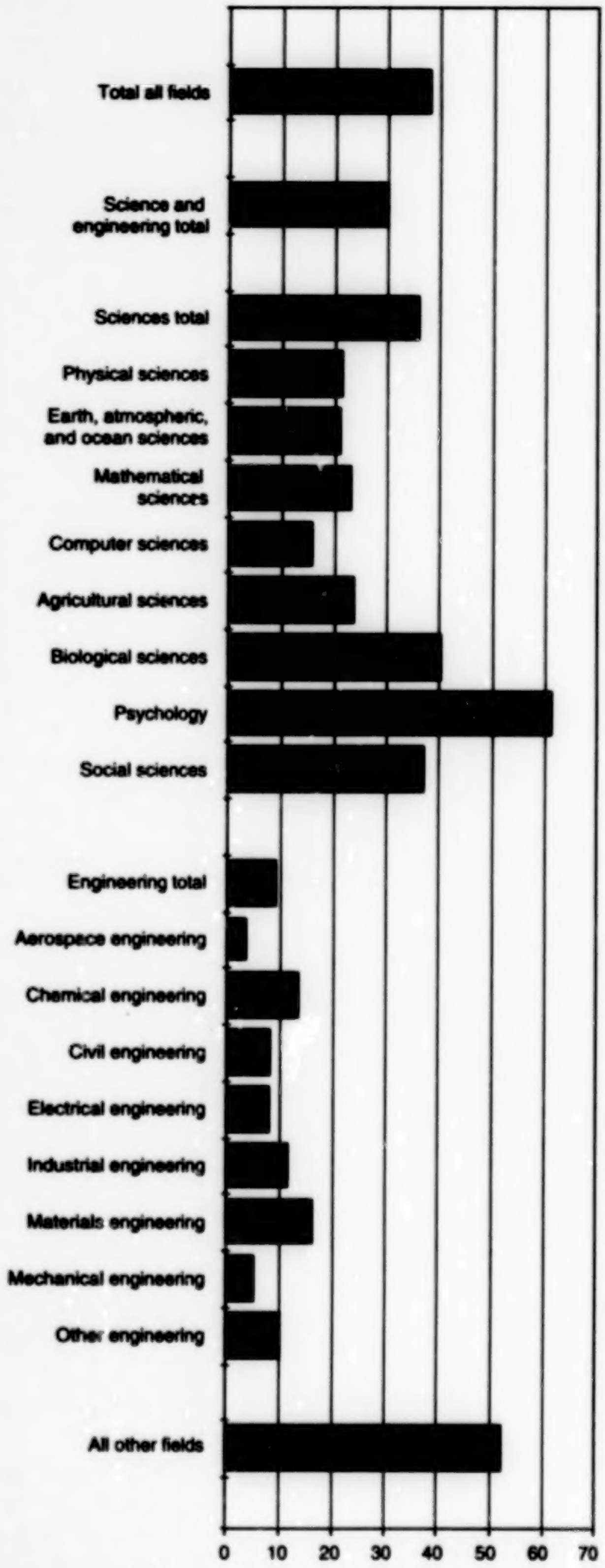
In 1993, women earned the highest percentage of doctorates in psychology (61 percent), the only broad science field in which women received a majority of the doctorates. Psychology was followed by biological sciences (40 percent of all awards went to women) and the social sciences (37 percent). (See figure 4-12.) Men, on the other hand, earned the highest percentage of doctorates in engineering (91 percent), computer sciences (84 percent), physical sciences (79 percent), earth sciences (79 percent), and mathematical sciences (77 percent).

Women earned more doctoral degrees in all science and engineering fields in 1993 than 1983. Although their

Text table 4-3.
Percentage of women doctorates in science and engineering, 1983 and 1993

	1983	1993
Science and engineering	25	30
Science fields	29	36
Engineering	4	9

Figure 4-12.
Percentage of doctorates awarded to women, by field: 1983



See appendix table 4-24.

numbers remained small in several science fields in 1993, they earned almost four times as many doctorates in computer science, almost twice as many in mathematics, and more than twice as many in the physical sciences as 10 years earlier. Men earned fewer degrees in agriculture and in psychology in 1993 than 1983.

Where They Study

Women received the majority of doctorates awarded in science fields at two California universities—the California School of Professional Psychology and the United States International University. In no institution

The Rites and Wrongs of Passage: Critical Transitions for Female PhD Students in the Sciences

Henry Etzkowitz, Carol Kemelgor, and Joseph Alonzo have identified several “critical transitions” in the graduate experience in science and engineering where PhD students are “propelled forward, pushed out, or dropped down to a lower level” (1995). When successfully negotiated, these “ceremonies”—

- taking the qualifying examination
- finding a research advisor
- arriving at a dissertation topic
- bringing work to the closure that earns the degree

—constitute the *rites* of passage to a doctorate. When too challenging, they turn into *wrongs* that can (and often do) impede progress. According to findings by Etzkowitz and his colleagues, many women science and engineering doctoral candidates find these initiations to be barriers.

Rites and Wrongs follows up earlier research[15] in which Etzkowitz and his colleagues interviewed 155 women doctoral candidates from a nationwide sample of science and engineering departments that included two that had graduated the most women; two that had graduated the fewest; and two that had shown the greatest improvement in increasing awards to women (1975–1990). In *Rites and Wrongs*, the researchers found that, “These academically superior women, who had typically been at the top of their undergraduate classes, were shocked upon entering graduate school to find themselves marginalized and isolated.”

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[15] Etzkowitz, Kemelgor, Neuschatz, and Uzzi (1994) and Etzkowitz, Kemelgor, Neuschatz, Uzzi, and Alonzo (1994).

The Rites and Wrongs of Passage: Critical Transitions for Female PhD Students in the Sciences

Although the "blind" grading of qualifying exams can lead to a welcome gender-neutral situation, "women tend to internalize difficulties and resort to self blame in contrast to men..." Female students often find it hard to establish the camaraderie with advisors so valuable to males and—without this collegiality—can fail to collect the advisor's vital invitations to and introductions at conferences that place his/her "social capital...like a mantle around the student." And, if these "issues of isolation, lack of direction, contacts, and conflict around...life choices continue to dominate, the student may withdraw before earning her degree."

For many of the women with science and engineering doctorates tracked by Etzkowitz and his colleagues to postdegree placements and interviewed, "the overwhelming [graduate school] experience...is that of isolation and disconnection in their departments and, in the most severely negative academic environments, among themselves."

Conclude Etzkowitz and his colleagues,

> Critical transitions for women in science are not yet "rites of passage" into a welcoming community; transition points are often fraught with peril for female scientific careers. As women ascend the educational ladder, they increasingly find support at the early stages, only later to encounter the exercise of arbitrary authority or simple inattention to women's needs.

On other barriers women face in science and engineering, see Etzkowitz and Kemelgor, with Neuschatz, Uzzi, Mulkey, Seymour, and Alonzo (in press).

did they earn the majority of degrees in engineering, earning none in 11 of the universities awarding women the most science and engineering doctorates and a high of 28 at Stanford University (14 percent of degrees conferred). (See appendix table 4-25.)

Minorities

Since 1983, minorities—both Asian and other—increased the numbers of doctorates they earned and their percentage of the total degrees awarded. (See figure 4-13.) As was the case with master's degrees, whites and Asians together accounted for most of the increase in numbers of science and engineering doctorates. In terms of proportional increase of groups of individuals earning such doctorates, however, whites gained the smallest percentage—8 percent—compared to 106 percent for Asians, 91 percent for Hispanics, 43 percent for American Indians, and 38 percent for blacks. For all of the underrepresented minorities, the numbers of science and engineering doctorate recipients in 1993 were very small: fewer than 600 went to Hispanics, fewer than 500 to blacks, and fewer than 50 to American Indians. Numbers of doctorates awarded to all groups increased between 1983 and 1993. (See appendix table 4-26.)

Foreign nationals with permanent visas increased both their numbers of earned doctorates and their proportion of the total awards over the decade. In science and engineering fields, they recorded the largest jump—733 more doctorates than 1983—a percentage rise from 6 to 10 percent of the doctorates awarded to U.S. citizens and permanent residents.

U.S. citizens and permanent residents earned well over 16,000 doctorates in science and engineering fields in 1993, 14 percent more than they had earned a decade earlier. Of this number, 16 percent were earned by minorities (6 percent by blacks, Hispanics, and American Indians). (See figure 4-14.) Asians increased their percentage substantially in science and engineering as well as other fields. (See appendix tables 4-26 and 4-27.)

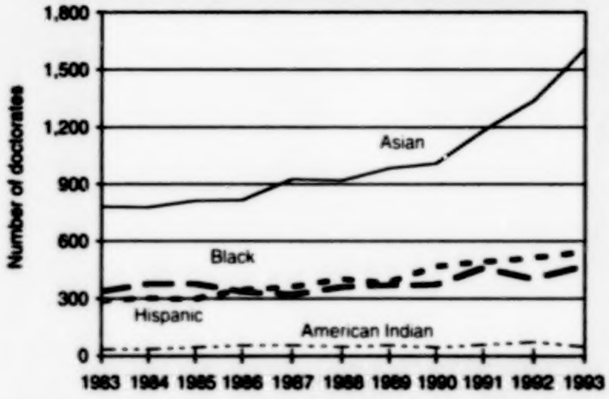
Asians

Between 1983 and 1993, Asians increased their representation in doctorates in all fields, earning 891 degrees in 1993, over 3 percent of the total to U.S. citizens. Their number among doctorates awarded in science and engineering also increased, to 713 in 1993—5 percent of such doctorates awarded to citizens and permanent residents.

Blacks

In 1993, although the proportion of doctorates earned by black U.S. citizens in all fields remained at the roughly 4 percent they held in 1983, they earned 184 more degrees. Their 2 percent proportion of science and engineering doctorates also remained steady over the decade; however, they earned 77 more degrees in 1993 than 1983. The most popular science and engineering field by far for black U.S. citizens and permanent residents at the doctorate level was psychology, which accounted for almost one-third of all of the science and engineering doctorates awarded. (See figure 4-15.)

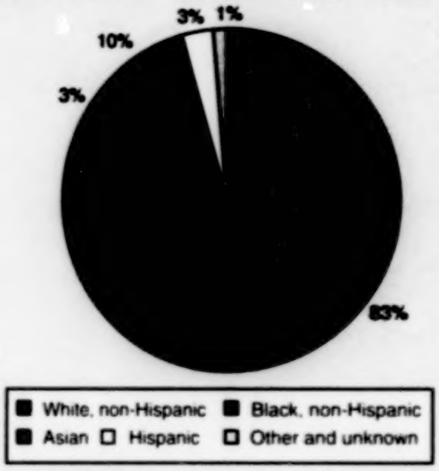
Figure 4-13.
Doctorates awarded to minorities in science and engineering fields, by race/ethnicity: 1983–1993



NOTE: U.S. citizens and permanent residents only.

See appendix table 4-26.

Figure 4-14.
Percentage of U.S. citizen science and engineering doctorate recipients, by race/ethnicity: 1993



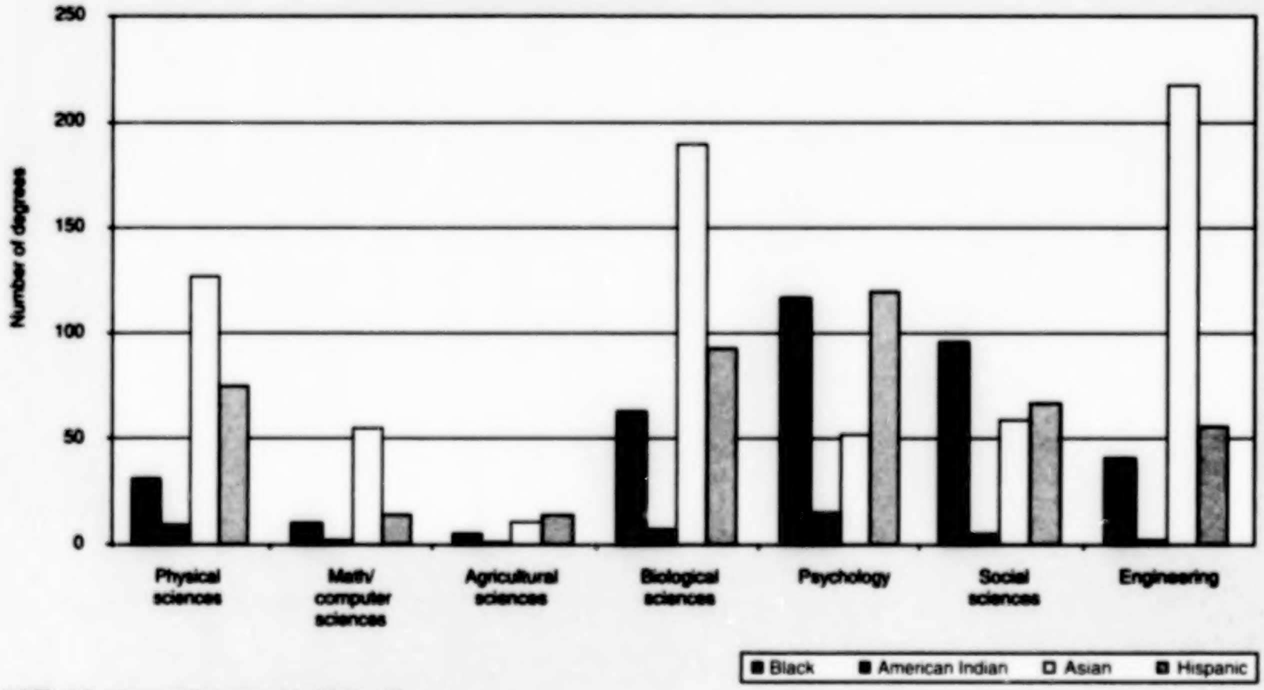
See appendix table 4-26.

Hispanics

In 1993, Hispanics earned 834 doctorates in all fields, just over 3 percent of the doctorates earned by all U.S. citizens. They increased both their total doctorates and percentage from 1983 (539 and 2 percent, respectively).

The number of science and engineering doctorates earned by Hispanics increased by 87 percent over the decade, though, as in the case of blacks, the numbers remained relatively small. In science and engineering, Hispanics earned 446 of the doctorates to U.S. citizens in 1993, 3 percent of the total. In this area they also increased both their numbers—up from 239—and their proportion—up from 2 percent in 1983. The most popular science and engineering field at the doctorate level for Hispanics was psychology, the field chosen by 27 percent of Hispanics earning science and engineering doctorates.

Figure 4-15.
Science and engineering doctorate recipients, by field and race/ethnicity: 1993



NOTE: U.S. citizens and permanent residents only.

See appendix table 4-27.

American Indians

In 1993, only 119 American Indians earned doctorates in all fields (43 of them in science and engineering), in both cases, well under 1 percent of the total. The most popular field was psychology (37 percent of all science and engineering doctorates).

Where They Study

Although doctoral education in the United States is a national resource, operating to some extent in a national market, awards of science and engineering doctorates to U.S. citizens show regional variations by race/ethnicity. Asians earned 44 percent of the doctorates to minorities who are U.S. citizens (and 5 percent of all doctorates to U.S. citizens). In only one case did more than two American Indians earn degrees from the same institution in 1993; in contrast, more than 120 Asians earned doctorates at three large California universities combined. Hispanics, who earned 3 percent of the science and engineering doctorates awarded in 1993 to U.S. citizens, were also concentrated in California at the University of California (Berkeley and Los Angeles campuses); nine or more of them also graduated from the University of Puerto Rico–Rio Piedras Campus, the University of Miami (Florida), two Texas universities, and Ohio State University. (See appendix table 4-28.) All these institutions except Ohio State are located in areas where many Hispanics live.

Students With Disabilities

Individuals reporting disabilities earned only 329 science and engineering doctorates in 1993, just over 1 percent of the 25,184 total such degrees awarded. Two-hundred-and-eighty-four of those degrees were in science fields; 45 in engineering. Sixty-two percent of the science doctorates awarded to persons reporting disabilities were fairly evenly distributed across three fields—the biological and social sciences and psychology. (See appendix table 4-29.) Small as the numbers are, they represent an 18 percent increase over the 280 science and engineering doctorate earners with disabilities self-reporting the year before (NSF 1994, p. 83).[16]

Persons with disabilities are more likely than other doctorate earners to take their degrees in psychology (22 percent compared to 14 percent) and in the social sciences (20 percent compared to 14 percent) and less likely to take doctorates in engineering (14 percent compared to 23 percent).

The trend of respondents to report "other" or "unknown" when requested to identify their disabilities continued upward. Those reporting "other" disabilities or not responding rose from 23 percent in 1988 to 40 percent in 1993. (See NSF 1994, p. 84, and appendix table 4-30.) This choice may reflect the growing number of individuals claiming learning and health-related disabilities as well as those unable or unwilling to define their disability within the other categories offered.

The race/ethnicity of U.S. citizens with disabilities holding doctorates in science and engineering parallels that of all who hold such degrees, with one exception. Asians earned 5 percent of all U.S. citizens' doctorates in science and engineering. (See appendix table 4-26.) They constitute only 3 percent of the persons with disabilities earning doctorates in science and engineering. (See appendix table 4-31.)

Earning a doctorate generally takes longer for students with disabilities than for those without. Almost half of all graduate students with disabilities in 1993 spent more than 10 years completing their science and engineering doctorates; only a third of all graduate students in those fields spent as long. (See figure 4-16, box "Students With Disabilities Studying Science, Engineering, and Mathematics: The Time Disadvantage" on page 32, chapter 3.) For variations on time from baccalaureate to doctorate by sex and field, see appendix table 4-5.

Postdoctorates

Postdoctorates offer individuals interim opportunities to continue their careers while searching for permanent appointments in academia or industry. Postdoctoral positions in science and engineering fields, which have increased in number since the mid-1980s,[17] have historically been more prevalent in scientific fields such as biological sciences than in engineering. Recent years have seen more postdoctoral students in other fields.

Since 1988, men have been appointed to more postdoctoral positions in all science and engineering fields than have women; however, the proportion of science and engineering postdoctorates awarded to women edged from 25 percent in 1988 to 28 percent in 1993. (See appendix table 4-33.) Asians holding doctoral degrees are more likely to enter postdoctoral training positions than blacks, Hispanics, or American Indians (Smith and Tang 1994, p. 107). Although postdoctoral appointments have continued to increase steadily, the largest proportionate gain between 1988 and 1993 occurred among the few women postdoctorates in anthropology, where their proportion went from 34 percent of the appointments to 56 percent. [18]

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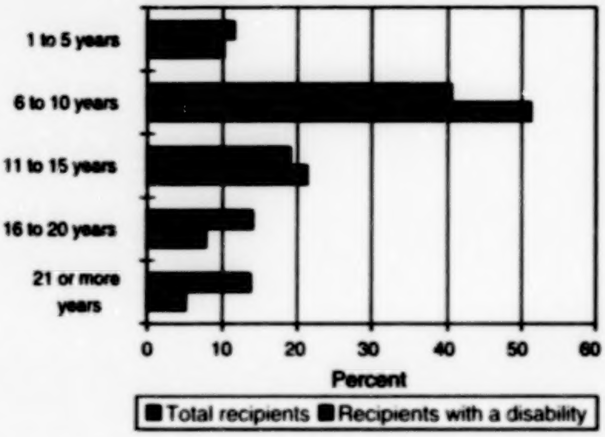
[16] Changes in the willingness of respondents to identify themselves as having a disability may also account for some of this increase over time. (See chapter 3.)

[17] Data on postdoctorates are collected neither by racial/ethnic group nor by disability status.

[18] 1991–1993 data from the American Anthropological Association report that women faculty in that field make up 35 percent of full professors, 31 percent of associates, and 31 percent of assistants (Givens and Jablonski 1995). This distribution among ranks is more uniform than that shown among the full-time ranked science and engineering faculty on appendix table 5-27.

Figure 4-16.
Time between bachelor's and doctoral degrees, by disability status: 1993



See appendix table 4-32.

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CHAPTER 5

EMPLOYMENT

Overview

Women, minorities, and persons with disabilities are a smaller proportion of the science and engineering labor force than they are of science and engineering degree recipients. Women earned 43 percent of combined bachelor's, master's, and doctoral science and engineering degrees in 1993 (see appendix tables 3-25, 4-20, and 4-23) but were 22 percent of the science and engineering labor force.[1] (See appendix table 5-1.) Blacks, Hispanics, and American Indians were 6 percent and persons with disabilities were 5 percent of the science and engineering labor force. (See appendix tables 5-2 and 5-3.)

As data in chapters 3 and 4 show, the fraction of science and engineering degrees going to women and minorities has increased over time. Because the labor force is composed of many years' worth of degree recipients and because women and minorities were a smaller fraction of earlier years' degree recipients, one would expect women and minorities to be a smaller fraction of the labor force as a whole than they are of current degree recipients. Among those who received degrees since 1990, the fraction of the science and engineering labor force who are women and minorities is much larger: 32 percent are women, and 8 percent are black, Hispanic, or American Indian. (See appendix table 5-4.)

Even among the more recent graduates, one would not expect the proportion in the labor force to equal the proportion of degrees. Taxonomy differences in science and engineering education and employment make it difficult to compare participation in science and engineering education with participation in science and engineering employment. Some who receive degrees in what is counted as science and engineering and consider themselves to be employed in their field may not be counted as being employed in science and engineering occupations. As an example, some who receive degrees in sociology (a science degree) become social workers (a nonscience occupation). Because of these taxonomy differences, field differences among men and women science and engineering degree recipients may influence participation in the science and engineering labor force.

This chapter examines the participation and employment characteristics of women, minorities, and persons with disabilities in the science and engineering labor force. Much of the data for this chapter come from NSF's SESTAT (Scientist and Engineer Statistics Data System) surveys.[2] The 1993 surveys are substantially different from those conducted in the 1980s in terms of the sample, question wording, and response rates. In most cases, therefore, it is not possible to present meaningful trend data. Data on science and engineering faculty come primarily from the NCES 1993 National Study of Postsecondary Faculty. See the appendix for more information on data sources.

Women Scientists and Engineers

Women are 22 percent of the science and engineering labor force as a whole (see figure 5-1) and were 20 percent of doctoral scientists and engineers in the United States in 1993, compared with 19 percent in 1991.[3]

Field

Within science and engineering, women are more highly represented in some fields than in others. Women are more than half of sociologists and psychologists but are only 9 percent of physicists and 8 percent of engineers. (See appendix table 5-1.) Doctoral women scientists and engineers are likewise more heavily represented in some fields than in others. For example, women are 41 percent of doctoral psychologists, and 28 percent of biologists but only 4 percent of engineers. (See figure 5-2.)

In many fields, women scientists and engineers are much more likely than men to have the bachelor's degree as their highest degree. Women are 32 percent of bachelor's computer/mathematics scientists but only 18 percent of doctoral computer/mathematics scientists. (See appendix table 5-1.) Because of these differences in highest degree, the science and engineering work done by women is often very different from that done by men. For example, in the biological sciences, women are

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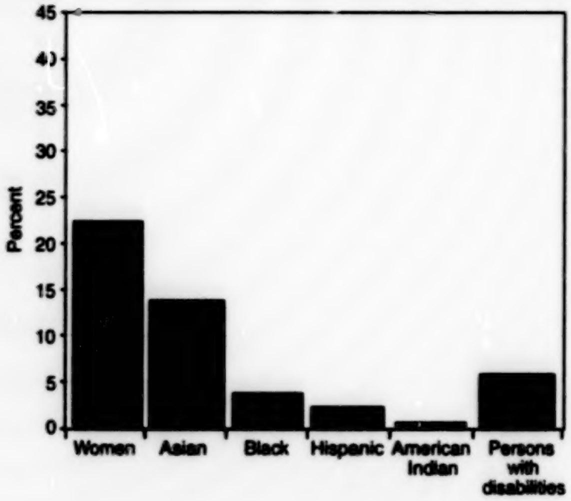
[1] Includes science- and engineering-related occupations and postsecondary science and engineering teachers.

[2] Totals may vary from table to table because of differences in the population referred to in the table and because of "no reports."

[3] For 1991 figures, see *Women, Minorities, and Persons With Disabilities in Science and Engineering: 1994*, p. 95.

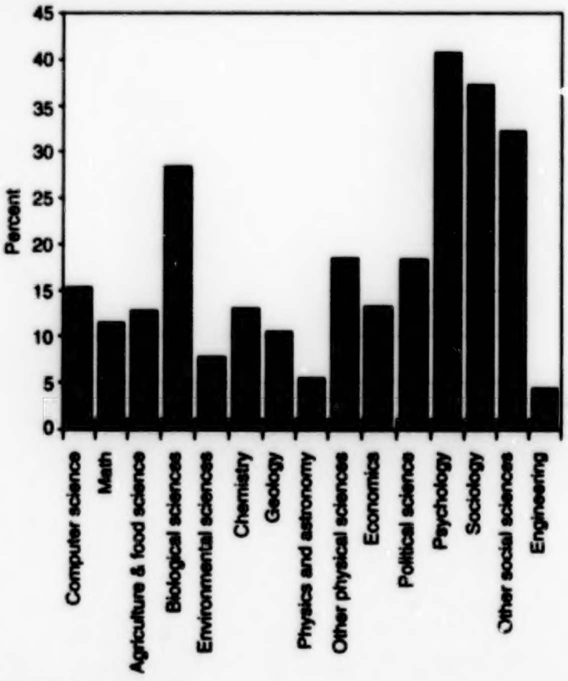
Figure 5-1.
Women, minorities, and persons with disabilities as a percentage of scientists and engineers in the labor force: 1993



See appendix tables 5-1, 5-2, and 5-3.

NOTE: The percentages here are not mutually exclusive.

Figure 5-2.
Women as a percentage of doctoral scientists and engineers in the labor force, by field of doctorate: 1993



See appendix table 5-5.

47 percent of the bachelor's biological scientists and only 29 percent of the doctoral biological scientists. (See appendix table 5-1.) Biological scientists with bachelor's degrees may have as their primary activity testing and inspection or technical sales or service, or they may be biological technicians, medical laboratory technologists, or research assistants. Biological scientists with doctoral degrees typically teach in universities, perform independent research, or are managers or administrators in industry.[4]

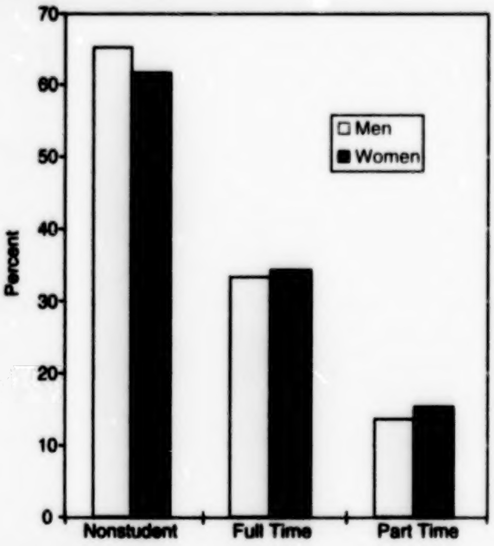
Employment and Unemployment

Bachelor's and Master's Scientists and Engineers

Recent men and women bachelor's science and engineering graduates are similar in their pursuit of postgraduation education but differ in employment status. About 30 percent of new bachelor's graduates do not immediately seek employment. Instead, they pursue graduate study either full time or part time. (See figure 5-3.) In 1993, women and men 1992 science and engineering graduates were about as likely to be enrolled in graduate school (32 percent of women versus 29 percent of men). (See appendix table 5-6.)

Recent men and women bachelor's graduates differ more in postgraduation employment status than they do in postgraduation education. Men bachelor's science and engineering graduates are more likely to be in the labor force, to be employed full time, and to be

Figure 5-3.
Percentage of 1992 bachelor's science and engineering graduates in full- or part-time graduate study, by sex: 1993



See appendix table 5-6.

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[4] U.S. Department of Labor, Bureau of Labor Statistics, *Occupational Outlook Handbook, 1994–95*, May 1994, Bulletin 2450.

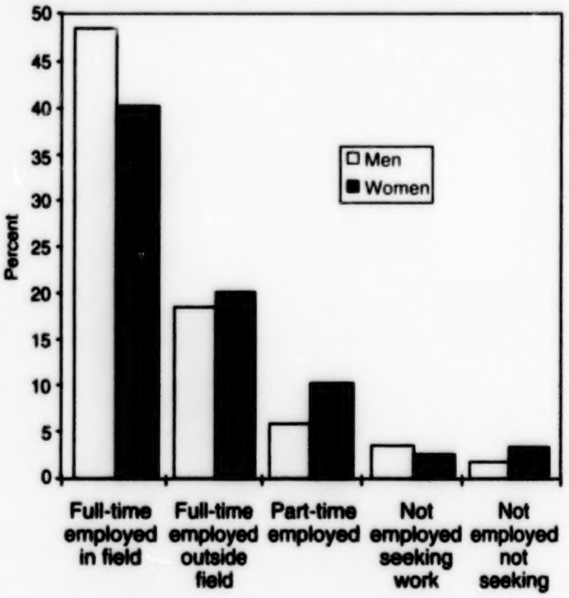
employed in their field than are women. (See figure 5-4.) Women are more likely than men to be out of the labor force, to be employed part time, and to be employed outside their field. Women are 44 percent of the 1992 bachelor's science and engineering graduates but are 58 percent of those out of the labor force (i.e., not employed and not seeking employment), 54 percent of those employed part time, and 47 percent of those employed full time outside their field. (See appendix table 5-6.)

Some of these differences are due to family-related reasons, often demands of a spouse's job or presence of children. Among recent bachelor's graduates, 29 percent of women but only 1 percent of the men who are not employed cited family responsibilities as the reason for not working. (See appendix table 5-7.)

Field differences contribute to some of these differences in employment status as well. Undergraduate education in science and engineering is not necessarily preparation solely for science and engineering employment. Science and engineering education at the undergraduate level is broadly applicable in a number of fields outside science and engineering.

Among employed recent science and engineering bachelor's graduates, women are less likely than men to be employed in science and engineering occupations. Only 18 percent of the employed new women graduates compared with 35 percent of the new men graduates are employed in science and engineering. (See appendix table 5-8.) Those who are not employed in science and engineering occupations are, for the most part, in related occupations, such as clinical psychology, social work, management, secondary education,[5] and sales and marketing. (See figure 5-5.) Because they are more likely than men to earn degrees in the social sciences, women are more likely than men to be employed in social services and related occupations and, because of family concerns, cultural norms, or personal preference, are more likely than men to be employed in secondary education.

Figure 5-4.
Employment status of 1992 bachelor's science and engineering graduates, by sex: 1993



See appendix table 5-6.

NOTE: A respondent is employed "in field" if he or she responded that his or her current work is "closely related" or "somewhat related" to degree. Employment status excludes full-time students.

Part of the reason women bachelor's science and engineering graduates are less likely than men to be employed in science and engineering occupations is that women are not highly represented in fields in which a bachelor's degree is sufficient for employment within the field. Engineering and computer science, fields in which women are not highly represented, typically provide "professional" employment with bachelor's degrees. Thus, new bachelor's graduates in these fields are likely to find employment in their field: 72 percent of 1992 bachelor's computer science graduates and 65 percent of new bachelor's engineering graduates found full-time employment in their field.

Other fields typically require graduate education for "professional" employment in the field. New bachelor's graduates in these fields are least likely to be employed within their field. Life sciences and social sciences, fields in which women are highly represented, are two such fields: only 37 percent of 1992 bachelor's social science graduates and 32 percent of 1992 bachelor's life science graduates found full-time employment in their field.

Unemployment rates of men and women recent bachelor's graduates do not differ greatly: 4.1 percent of women and 4.7 percent of the men 1992 bachelor's science and engineering graduates were unemployed in April 1993. (See appendix table 5-6.)

Doctoral Scientists and Engineers

The overall labor force participation rates of doctoral men and women scientists and engineers are similar—about 92 percent of both men and women are in the labor force. The labor force participation rates of men and women who received their doctorate in similar time periods are quite different, however. Within degree cohorts, men have higher labor force participation rates than women. For example, among 1980–1984 graduates, the labor force participation rate for men is 99.1 percent; for women, it is 93.8 percent. (See appendix table 5-9.) Because a higher fraction of men than women are in the earlier degree cohorts (e.g., those who received degrees before 1960) and those in earlier

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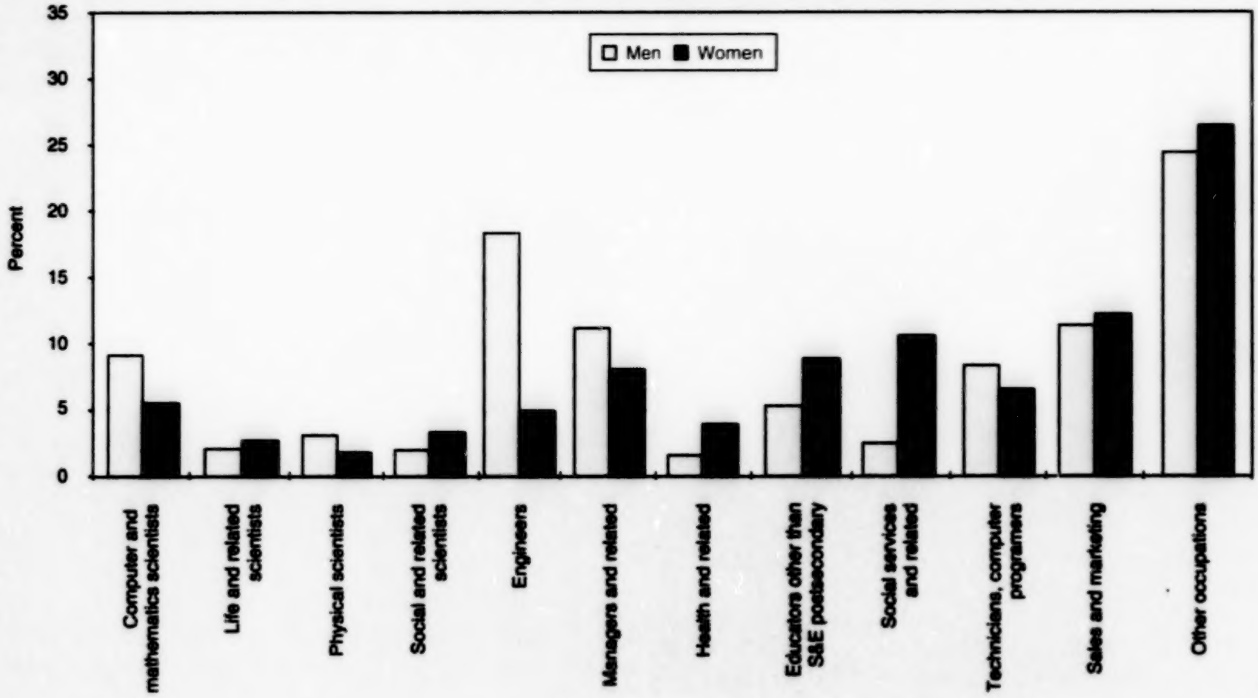
[5] Secondary science and mathematics teaching is not considered employment in science or engineering because most who are employed in this area have degrees in education, not in science or engineering. Only 29 percent of the science and mathematics secondary teachers responding to the National Survey of College Graduates had degrees in science or engineering.

Figure 5-5.
Occupations of employed 1992 bachelor's science and engineering graduates, by sex: 1993.



See appendix table 5-8.

degree cohorts have lower labor force participation rates, largely due to retirements, men's overall participation rate averages out to about the same as women's.

Among doctoral scientists and engineers, 12 percent of women and 4 percent of men are employed part time. (See appendix table 5-10.) Women who are employed part time are far more likely than men to cite family responsibilities as the reason. (See appendix table 5-11.) About half of the doctoral women working part time and about 5 percent of the men cited family responsibilities as the reason for working part time. Women with children under age 18 are more likely than men with or without children and women without children to work part time or to be unemployed. (See appendix table 5-12.)

Women and men who have children face the problem of trying to balance work and family. Twenty-one percent of doctoral women scientists and engineers with children under 18, but only 2 percent of comparable men, are employed part time. Both men and women face the problem of balancing work and family when employers demand primary commitment to work. Even companies with family-friendly programs frequently discourage their use.[6]

New doctoral scientists and engineers are more likely than bachelor's scientists and engineers to find employment in their field. Among full-time employed doctoral scientists and engineers, 93 percent are employed in their field, compared with 70 percent of full-time employed bachelor's scientists and engineers. (See appendix tables 5-6 and 5-10.) Doctoral women who are employed full time are as likely as men to be in jobs related to their degree.

Family status influences exit rates out of science and engineering employment. Married scientists and engineers and those with children are more likely to leave science and engineering employment than those who are not married and do not have children.[7] Within each family status category, however, differences between men and women remain. Single women are more likely than single men to leave science and engineering employment. Married women without children are more likely than married men without children to leave science and engineering employment, and women with children are more likely than men with children to leave science and engineering employment.

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[6] Committee on Women in Science and Engineering, National Research Council. 1994. *Women Scientists and Engineers Employed in Industry: Why So Few?* Washington, DC: National Academy Press.

[7] Preston, Anne E. 1994. Presentation on "Occupational Departure of Employees in the Natural Sciences and Engineering" cited in Committee on Women in Science and Engineering, National Research Council Committee on Women in Science and Engineering. 1994. *Women Scientists and Engineers Employed in Industry: Why So Few?* Washington, DC: National Academy Press.

Women's Persistence in Science After Graduation

Rayman and Brett (1995) found parental encouragement and attitudes about work and family to be important determinants of women's persistence in science after graduation. Other factors influencing persistence included encouragement from college teachers, having had a mentor as an undergraduate, having received career advice from faculty, having had an undergraduate research experience, and having a high interest in science.

Parental encouragement contributed significantly to whether or not a woman stayed in science after graduation. Encouragement from either mothers or fathers was important, and encouragement from both together was even better. Using a logistic regression model, the authors calculated that the odds of science majors staying in science after graduation were 2.6 times greater if one parent gave a lot of encouragement and 6.7 times greater if two parents gave a lot of encouragement. Family characteristics, such as parental education and occupation, were not related to persistence although they are related to choice of major in science or mathematics.

In this study, three groups of women who majored in science and mathematics as undergraduates at a leading women's college were characterized by persistence in science: "leavers" left the sciences immediately after graduation, "changers" switched to other occupations sometime after graduation, and "stayers" remained in the sciences.

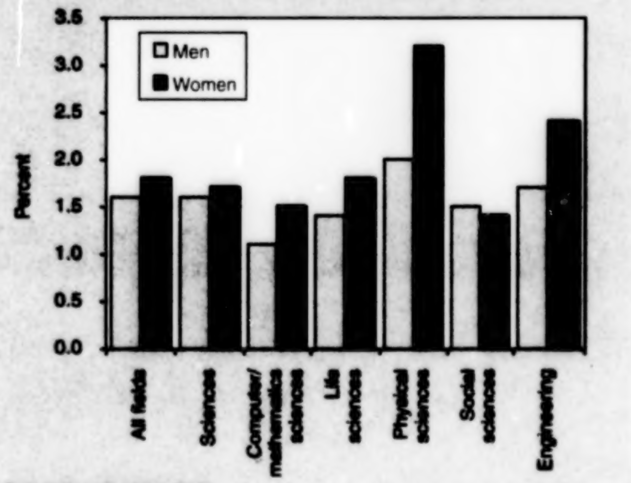
Among the three groups, stayers were most likely to have received encouragement from their parents, especially their mothers, to pursue a career in science. They were least likely to believe their current occupation was compatible with family life.

Changers were most likely to have received a lot of encouragement from mothers and to have had mothers in science or health-related occupations. They were also more likely to have moved for a spouse, to have worked less than full time to provide caregiving, and to be in nonscience occupations that were compatible with family life. Both leavers and changers were more likely than stayers to believe that mothers with infants should not work at all. Changers were less likely than the other two groups to have had encouragement from mothers to pursue a career in science, to have had encouragement from college teachers, to have had a mentor, to have received career advice from faculty, and to have had undergraduate research experiences.

Leavers were less likely than the other two groups to have had a father or mother in science; to have had a mother who went to college; to have received a lot of encouragement from mothers, fathers, or college teachers to major in or pursue a career in science; to have received career advice from advisors; to have done undergraduate research; and to have a high interest in science.

Women doctoral scientists and engineers are more likely than men to be unemployed, although the difference is small. The unemployment rate[8] for doctoral women in 1993 was 1.8 percent; for men it was 1.6 percent.[9] (See figure 5-6.) Within fields, the differences in unemployment rates are larger, especially in the fields that have fewer women. For example, among physical scientists, the unemployment rate for women is 3.2 percent compared with a rate of 2.0 percent for men. (See appendix table 5-13.) Among engineers, the unemployment rate for women is 2.4 percent compared with a rate of 1.7 percent for men. Among social scientists, on the other hand, the unemployment rates are more nearly equal—1.4 percent for women and 1.5 percent for men.

Figure 5-6.
Unemployment rates of doctoral scientists and engineers, by field of doctorate and sex: 1993.



See appendix table 5-13.

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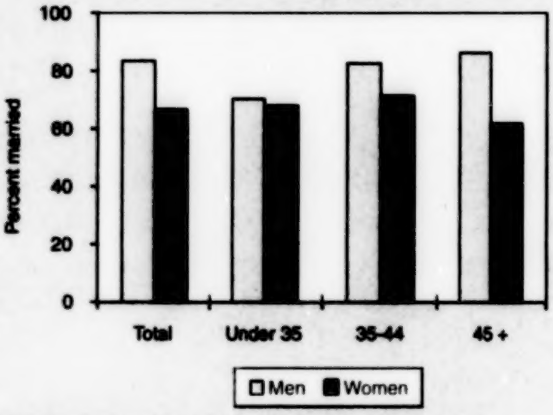
[8] The unemployment rate measures the percentage of those in the labor force who are not employed but are seeking work.

[9] The difference in unemployment rates is statistically significant, i.e., it is larger than expected from chance fluctuations.

Are Marriage and Science Compatible for Women?

Doctoral women scientists and engineers are far less likely than men to be married: 66 percent of women doctoral scientists and engineers are married, compared with 83 percent of men. (See figure 5-7.) Doctoral women are twice as likely as men never to have married or to be divorced. Twelve percent of the women, but only 6 percent of the men, were divorced, and 19 percent of the women, but only 9 percent of the men, were single and never married.

Figure 5-7.
Percentage of doctoral scientists and engineers who are married, by age and sex: 1993



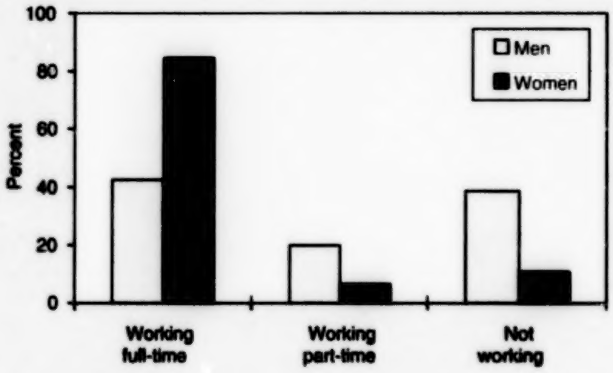
SOURCE: National Science Foundation/SRS. 1993 Survey of Doctorate Recipients.

One factor in the differing marital status of men and women scientists and engineers is the younger ages of the women—16 percent of the doctoral women, but only 10 percent of the doctoral men, are younger than 35. Among younger doctoral scientists and engineers, more nearly equal proportions of men and women are married. Among those 35 or older, however, women are far less likely than men to be married. For example, among doctoral scientists and engineers between the ages of 45 and 54, 64 percent of the women, compared with 85 percent of the men, are married.

Among those who are married, women scientists and engineers are also more likely than men to face problems in accommodating dual careers. Doctoral women are twice as likely as men to have a spouse working full time. (See figure 5-8.) Eighty-four percent of the married women, but only 42 percent of the married men, have a spouse working full time. Only 10 percent of the married women, but 38 percent of the married men, have a spouse not working.

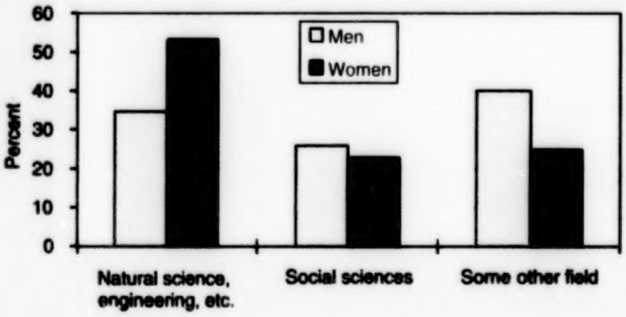
Women scientists and engineers who are married are more likely than men to be married to a scientist or engineer. (See figure 5-9.) Fifty-five percent of women, but only 32 percent of men, are married to a natural scientist or engineer.

Figure 5-8.
Percentage of married doctoral scientists and engineers, by employment of spouse and sex of respondent: 1993



SOURCE: National Science Foundation/SRS. 1993 Survey of Doctorate Recipients.

Figure 5-9.
Percentage of married doctoral scientists and engineers, by spouse occupation and sex of respondent: 1993



SOURCE: National Science Foundation/SRS. 1993 Survey of Doctorate Recipients.

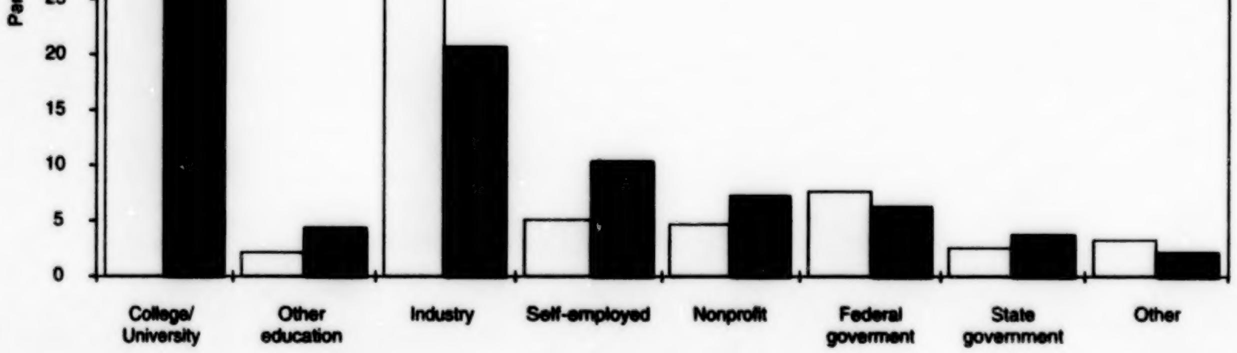
Sector of Employment

Bachelor's and master's scientists and engineers are employed predominantly in business or industry. Seventy-two percent of bachelor's scientists and engineers, and 56 percent of master's scientists and engineers are employed in this sector. (See appendix tables 5-14 and 5-15.) Doctoral scientists and engineers, on the other hand, are employed in diverse sectors: 45 percent are employed in universities or 4-year colleges, 30 percent are employed in business or industry, 10 percent are employed in government, and 15 percent are employed elsewhere. (See appendix table 5-16.)

Among bachelor's and master's scientists and engineers, women, minorities, and persons with disabilities are less likely than scientists and engineers as a whole to be employed in business or industry and are more likely to be employed in educational institutions. For example, among master's scientists and engineers, 63 percent of men and 39 percent of women are employed in business or industry and 16 percent of men and 32 percent of women are employed in educational institutions. (See appendix table 5-15.)

Among doctoral scientists and engineers, women are also less likely than men to be employed by private for-profit employers and are more likely than men to be employed in colleges and universities or to be self-employed. (See figure 5-10.) These differences in sector are mostly related to differences in field of degree. (See appendix table 5-17.) For example, women are less likely than men to be engineers or physical scientists, who tend to be employed by private for-profit employers. Forty-four percent of doctoral physical scientists and 53 percent of doctoral engineers are employed in business or industry, compared with 30 percent of all scientists and engineers. Within fields, women are about as likely as men to choose industrial employment, although some evidence indicates that women leave industrial employment at a greater rate than men.[10] The climate in industry may be perceived as less favorable to women for a number of reasons including recruitment and hiring practices, a corporate culture hostile to women, sexual harassment, lack of opportunities for career development and critical developmental assignments, failure to accommodate work-family issues, lack of mentoring, and lack of access to informal networks of communication.[11]

Figure 5-10.
Sector of employment of doctoral scientists and engineers in the labor force, by sex: 1993



See appendix table 5-16.

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[10] Anne Preston, "A Study of Occupational Departure of Employees in the Natural Sciences and Engineering," National Research Council Committee on Women in Science and Engineering conference, Irvine, CA, January 17, 1993.

[11] Federal Glass Ceiling Commission, "Good for Business: Making Full Use of the Nation's Human Capital," March 1995, U.S. Department of Labor, Washington, DC. See also Committee on Women in Science and Engineering, National Research Council, *Women Scientists and Engineers Employed in Industry: Why So Few?* 1994, Washington, DC: National Academy Press.

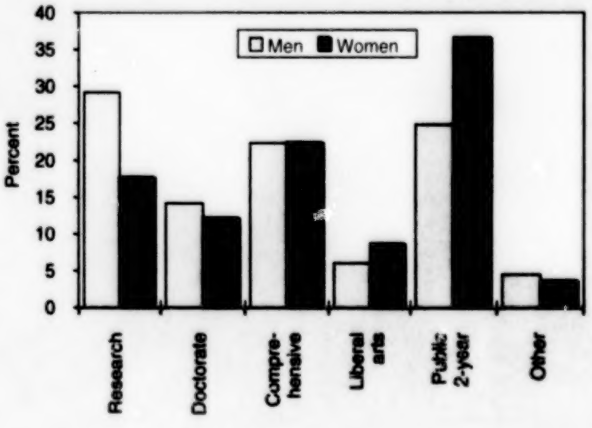
Women's greater tendency to be self-employed is also related to field of degree. For example, women are more likely than men to be psychologists, and psychologists are more likely than other scientists and engineers to be self-employed. Twenty-two percent of doctoral psychologists are self-employed, as opposed to only 6 percent of all scientists and engineers. (See appendix table 5-17.)

Academic Employment

The employment characteristics of women in colleges and universities are quite different from those of men. Women faculty differ from men in terms of teaching field, type of school, full-time or part-time employment, contract length, primary work activity, research productivity, rank, and tenure. The fields in which men and women faculty teach differ. Women faculty as a whole are less likely than men to be science and engineering faculty. Women are 44 percent of faculty in non–science-and-engineering fields but only 24 percent of science and engineering faculty. (See appendix table 5-18.) Within science and engineering, women faculty are a relatively small fraction of physical science and engineering faculty and are more highly represented among mathematics and psychology faculty. Women are 43 percent of psychology faculty and 31 percent of mathematics faculty but only 14 percent of physical science and 6 percent of engineering faculty.

The types of schools in which men and women teach differ. Women science and engineering faculty are far less likely than men faculty members to be employed in research universities and are far more likely to be employed in public 2-year schools. (See figure 5-11.) Differences in type of school are related to faculty employment status. Women science and engineering faculty are much more likely than men to teach part time (40 percent versus 25 percent). (See appendix table 5-19.) Two-year schools are much more likely than 4-year schools to hire part-time faculty. More than half of faculty, regardless of sex, who work in 2-year schools work part time. (See appendix table 5-21.)

Figure 5-11.
Distribution of science and engineering faculty, by type of school and sex: 1993



See appendix table 5-19.

Women are also more likely than men to have fixed-term contracts. Fifty-four percent of women science and engineering faculty are on a one-term or 1-year contract, compared to 34 percent of men. (See appendix table 5-20.) Some evidence indicates that such contracts are becoming more prevalent. Over the last 5 years, colleges and universities have moved toward replacing tenured or tenure-track positions with fixed-term contracts.[12]

The differences among men and women faculty in type of schools and employment status are partly related to the highest degree obtained. Fewer women than men science and engineering faculty have a PhD degree. A far higher proportion of women (42 percent) than men (24 percent) faculty have a master's degree as their highest degree. (See appendix table 5-22.)

Partly because of the types of schools in which they are employed, women science and engineering faculty are more likely than men to be involved primarily in teaching. (See appendix table 5-23.) Not only do they spend more time teaching than men, they also are more likely than men to report they prefer teaching to research. Within school types, men and women faculty are more nearly the same in the amount of time spent in teaching or research and in the preferred amount of time spent in teaching or research.

Women science and engineering faculty also do less research than men faculty. Women are less likely than men to be engaged in funded research, to be a principal investigator or co-principal investigator (see appendix table 5-24), or to have published books or articles in the previous 2 years (see appendix table 5-25). These differences remain even within research universities and among all age groups.

Among full-time science and engineering faculty, women are less likely to chair departments, are less likely to reach the highest academic ranks, and are less likely to be tenured than men. Eleven percent of women but 14 percent of full-time men science and engineering faculty chair departments. (See appendix table 5-26.)

Women scientists and engineers hold fewer high-ranked positions in colleges and universities than men. Women are less likely than men to be full professors and are more likely than men to be assistant professors or instructors. (See figure 5-12.) Part of this difference in rank can be explained by age differences, but differences in rank remain even after controlling for age. Among those who received their doctorate 13 or more years ago, 72 percent of men but only 55 percent of women are full professors. (See appendix table 5-27.)

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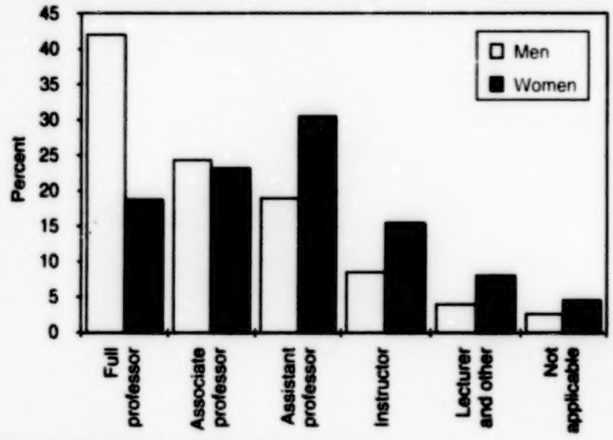
[12] U.S. Department of Education, National Center for Education Statistics. 1996. *Institutional Policies and Practices Regarding Faculty in Higher Education Institutions, 1992.*

Women are also less likely than men to be tenured or to be on a tenure track. Forty-three percent of full-time employed women science and engineering faculty are tenured, compared with 67 percent of men. (See figure 5-13.) As was the case with rank, some of the differences in tenure may be attributable to differences in age.

Nonacademic Employment

As noted earlier, bachelor's and master's scientists and engineers are employed primarily in business or industry, and women scientists and engineers are less likely than men to be employed in this sector. The type of work women scientists and engineers do also differs from that done by men. For example, 40 percent of bachelor's-level women but only 26 percent of bachelor's-level men report computer applications as their primary work activity. Thirteen percent of master's-level men and 9 percent of master's-level women are managers. (See appendix table 5-29.) Age differences largely explain differences in management status. Among bachelor's scientists and engineers between the ages of 30 and 39, roughly equal proportions of men and women are managers. Differences in field also have a lot to do with differences in primary work activities. For example, men are more likely than women to be engineers and are thus more likely to be engaged in development, design of equipment, and production.

Figure 5-12.
Academic rank of full-time ranked science and engineering faculty, by sex: 1993



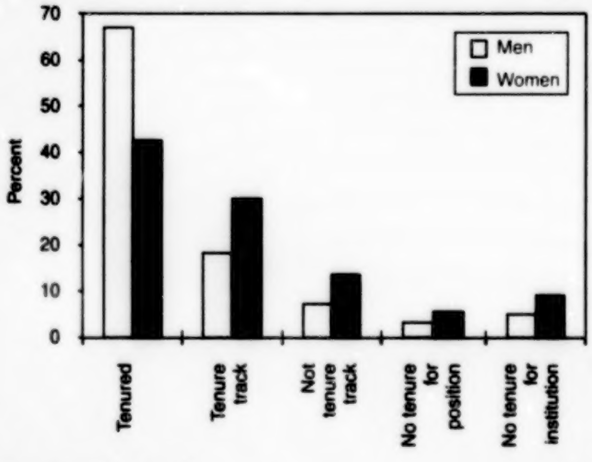
Includes faculty in all colleges and universities.

See appendix table 5-27.

Among doctoral scientists and engineers, nonacademic employment is more prevalent than academic employment in some fields, for example, chemistry and engineering. Women are less likely than men to be employed in these fields and are less likely than men to be employed in nonacademic settings.

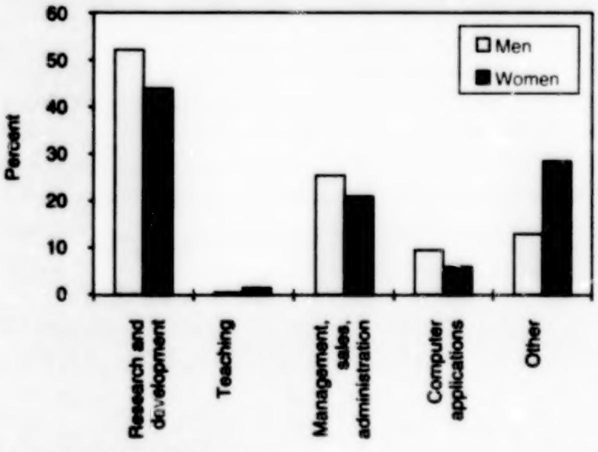
Within business or industry, women doctoral scientists and engineers are less likely than men to be in management. (See figure 5-14.) Twenty-five percent of doctoral men scientists and engineers and 21 percent of doctoral women scientists and engineers are in management. As was the case with bachelor's- and master's-level scientists and engineers, this difference is largely attributable to differences in age. Among employed industrial scientists and engineers who received doctoral degrees since 1985, 10 percent of men and 13 percent of women are managers. Among those who received degrees between 1970 and 1979, 32 percent of both women and men are managers. (See appendix table 5-30.).

Figure 5-13.
Tenure status of full-time science and engineering faculty, by sex: 1993



See appendix table 5-28.

Figure 5-14.
Primary work activity of doctoral scientists and engineers in business or industry, by sex: 1993



See appendix table 5-30.

Text table 5-1.
Median annual salaries of full-time employed 1992 bachelor's and master's science and engineering graduates by broad occupation and sex, 1993

Occupation	Bachelor's			Master's		
	Total	Men	Women	Total	Men	Women
Full-time employed in all fields	$23,000	$25,000	$20,000	$37,200	$39,000	$33,700
Computer and mathematics scientists	31,000	31,200	30,000	39,000	40,000	37,400
Life and related scientists	22,000	23,000	21,000	28,400	29,800	28,000
Physical scientists	25,000	25,000	26,500	36,000	36,000	32,000
Social and related scientists	19,200	20,000	18,000	27,800	31,000	25,600
Engineers	33,500	33,500	33,600	40,600	40,000	41,000
Managers and related	25,000	28,600	22,800	42,000	44,000	35,000
Health and related	17,700	19,200	15,500	28,400	30,000	28,200
Educators other than science and engineering	20,000	22,000	19,500	30,000	31,000	29,500
Social services and related	18,000	18,000	18,000	25,000	27,000	22,400
Technicians, computer programmers	25,200	25,500	22,900	34,000	33,800	34,000
Sales and marketing	22,500	22,700	22,000	25,000	27,000	22,400
Other occupations	18,000	18,700	17,700	26,400	28,000	23,000

SOURCE: National Science Foundation, National Survey of Recent College Graduates, 1993.

Salaries

Bachelor's and Master's Salaries

The 1993 median starting salary for recent women bachelor's science and engineering graduates was lower than that for men overall, largely because of differences in occupational field. Women are less likely than men to be computer/math scientists or engineers, who earn relatively high salaries. They are more likely than men to be social or life scientists, who earn relatively low salaries. Within fields, the median starting salaries for men and women were more nearly the same. (See text table 5-1.) For example, in engineering, the median salary for men was $33,500 and for women was $33,600. The starting salaries of men and women in computer and mathematical sciences, physical sciences, and sales and marketing were very similar.

Among more experienced bachelor's and master's scientists and engineers, the gap between men's and women's salaries is larger. (See appendix table 5-31.) As was the case for starting salaries, some of the differences in salary are due to differences in field. Salaries are highest in mathematical/computer science and engineering, fields in which women are not highly represented. Salaries are lowest in fields in which women are prevalent, such as life sciences and social sciences. Within each of these fields, the salaries of men and women are similar among those less than 30 years old, but differences between men's and women's salaries increase with increasing age. Such factors as number of years in the labor force, primary work activity, supervisory status, and number of people supervised also influence salaries and may account for some of the gap. The following section examines the influences on doctoral salaries, many of which also influence the salaries of those with bachelor's and master's degrees.

The Doctoral Gender Salary Gap

In 1993, among employed science and engineering doctorate-holders[13] who worked full time,[14] the average salary for women was $50,200 compared with $63,600 for men.[15] (See text table 5-2.) The observed gender salary gap of $13,300 is quite substantial and corresponds to women's making only 79 percent of what men make. As has been documented in this report, however, many differences between men and women in the doctoral labor force help explain this salary gap,[16] e.g., women are, on the average, younger than men and have more frequently majored in fields such as the social sciences that have relatively low pay.

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[13] The salary gap analysis focuses only on the doctoral salary gap. The salary gaps for those with bachelor's and master's degrees are, of course, also of interest, but time limitations and data availability did not permit such analyses for this report.

[14] Those sections of this chapter that analyze the salary gap exclude those who are self-employed and those who work part time, because annual salaries for part-time or self-employed work are not strictly comparable to full-time salaries. See the chapter 5 Technical Notes for information on how salary and some of the other variables were measured in this analysis.

[15] This analysis uses the 1993 Survey of Doctorate Recipients. It builds on an extensive literature in which the issue of the salary gaps for different populations is examined. See Blau and Ferber (1986) for an overview of literature on the gender salary gap.

[16] To examine the issue of salary equity, we use statistical techniques that permit a more comprehensive approach than is possible using the cross-tabulation approach used in most of this report. These techniques are discussed in the chapter 5 Technical Notes.

Text table 5-2.
"Explained" versus observed gender salary gap for science and engineering doctorate recipients: 1993

	Salary gap	% of observed gap
"Explained by" adjustment factors[a]		
Years since doctorate	$3,200	24.3
Field of degree	1,500	11.2
Other work-related employee characteristics	2,500	18.7
Employer characteristics	1,300	9.9
Type of work	2,000	14.9
Life choices"	1,400	10.6
Total "explained"	$11,900	89.6
Unexplained salary gap	1,400	10.4
Observed salary gap[b]	$13,300	100.0

[a] See the chapter 5 Technical Notes for an explanation of the methodology used in preparing this table.
[b] Average observed male salary: $63,600. Average observed female salary: $50,200.

NOTE: Detail may not add to total because of rounding.

SOURCE: SRS/NSF 1993 Survey of Doctorate Recipients

To determine how much of the $13,300 doctoral gender salary gap could be "explained" by differences between men and women on characteristics expected to affect their salaries, a statistical analysis was performed. This analysis permitted estimation of how large the salary gap would be if men and women in the doctoral labor force were similar on a large number of variables—the year the doctorate was received, science and engineering degree field, other work-related employee characteristics, employer characteristics, type of work performed, and indicators of "life choices." Together, these variables accounted for an estimated $11,900 of the observed $13,300 difference between the average salary of male science and engineering doctorate-holders and the average salary of female science and engineering doctorate-holders. The variables examined failed to explain the remaining $1,400 of the gap. This residual gap could have a number of possible causes:

- Although most of the important nondemographic factors that one would expect to affect differentially the salaries of men and women doctorate-holders were statistically controlled, it was not possible to control for all such factors.[17] Among the variables that would be interesting to add in the future are
  - measures of productivity, such as the number of books and articles published;[18]
  - prestige of the school or department from which the individual received his or her degree;[19]
  - prestige of the school or department at which employed;[20] and
  - more direct measures of the importance of salary as a factor in job selection.
- The measures of the variables examined are imperfect. Better measures of some of the variables might add to the ability to explain the gender salary gap. For example, 20 categories were used to measure degree fields. Within each of these degree fields, however, the subfields may differ from one another in terms of salary and gender representation.
- The results are also potentially influenced by other types of errors such as sampling error and nonresponse bias that are inherent in sample surveys.[21]
- Some or all of the "unexplained" gender salary gap may be attributable to "unequal pay for equal work." Indeed, the size of the unexplained gap may even be underestimated. For example, it is possible

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[17] See the chapter 5 Technical Notes for a discussion of how variables were selected for inclusion in the final model.

[18] Broder (1993) points out that this is a frequently used measure in the analysis of salary differentials in the academic labor market.

[19] Interestingly, Formby et al. (1993) did not find this variable significant in their analysis of the entry-level salaries of academic economists. Clark (1993), however, found significant impacts of both quality of granting institution and quality of employing institution on salary.

[20] Broder (1993) found an insignificant salary premium for prestige of the university in her sample of economists. Formby et al. (1993), however, found this variable to be highly significant. The type of academic institution, as measured by Carnegie code, is, in part, a measure of prestige; however, there are more refined measures available, though none that were mapped to the 1993 Survey of Doctorate Recipients at the time this analysis was performed.

[21] See *Guide to NSF Science and Engineering Resources* for an overview of the methodology employed in the 1993 Survey of Doctorate Recipients, including possible sources of error.

that chance has led to the inclusion of a disproportionately high percentage of high salaried women in the sample. Further, one can argue that some of the "explanatory" variables included in the analysis should have been excluded. For example, if one believes that the primary reason that women are less likely than men to go into certain fields is a perception that these fields are inhospitable to women, one might argue that field of degree should not be used as an "explanatory" variable when examining the salary gap between men and women.

In the remainder of this section, more detail is presented on the importance of the variables examined in contributing to the explanation of the gender salary gap.

Years Since Receipt of Doctorate

In the earlier chapters of this report, a long-term increase in the percentage of science and engineering doctoral degrees going to women was noted. Although this can be viewed as progress, it also means that women doctorate-holders are, on average, more recent doctorate recipients than are men. In 1993, the average full-time employed woman science and engineering doctorate-holder had received her doctorate approximately 10.4 years ago, compared to the average man who had received his degree approximately 15.7 years earlier. (See appendix table 5-32.) The gender difference in years since receipt of the doctorate "explains" approximately $3,200 of the observed $13,300 salary gap. (See text table 5-2.) This means that the difference in years since receipt of the doctorate accounts for almost one-quarter of the observed gender salary gap.

Field of Degree

Field of degree varies considerably between men and women. Women in the doctoral science and engineering population are disproportionately concentrated in psychology and the social sciences, whereas men are disproportionately represented in physics and engineering (see appendix table 5-32). Because science and engineering degree field is an important determinant of salary for the doctoral population, this variable may be helpful in explaining the gender salary gap. As seen in text table 5-2, it explains approximately $1,500 (11 percent) of the observed gender salary gap.[22]

Background Variables

Several variables on the 1993 Survey of Doctorate Recipients (SDR) that measure attributes of the individual's background prior to degree completion may affect salary. These variables are mother's education, father's education, and whether the individual lived in a rural area during the time he or she was growing up. None of these variables had a statistically significant impact on salary and, therefore, were not included in the final analysis.[23]

Other Work-Related Employee Characteristics

Individuals can, of course, enhance their job skills subsequent to receipt of the doctorate. They can engage in additional educational and training activities, obtain work experience, and participate in professional society activities. The SDR contains a considerable number of relevant measures to use in examining the impact of these variables on the gender salary gap. These include type of additional degrees (e.g., none, M.D., law degree) received since the science and engineering doctorate, whether the individual has taken additional courses since the last degree, the number of years of full-time work experience, whether the individual attended any professional society meetings or conferences within the last year, and the number of national or international professional society memberships.

Other work-related employee characteristics that are included in the SDR and that are associated with salary are age at time the doctorate was received, whether the individual has previously retired,[24] whether the individual has a license related to his or her occupation, whether the individual was employed in 1988, and if so, whether he or she has changed occupations since 1988.[25]

Text table 5-2 shows that these additional employee characteristics add considerably to an understanding of the gender salary gap. Collectively, they explain approximately $2,500 (19 percent) of the gap. Most of this explanatory power (13 of the 19 percentage points) is attributable to differences between men and women in years of full-time work experience. (See appendix table 5-32.) Also worthy of note is that age at time the doctorate was received explains approximately 5 percent of the gap, even though the difference in age between men and women at the time of degree is fairly small (33 years for women compared with 31 for men).

Employer Characteristics

Women science and engineering doctorate-holders are less likely to be employed in the private sector, where salaries are relatively high—21 percent of the women in this analysis were employed in this sector compared with 33 percent of the men. (See appendix table 5-32.) We therefore expect differences in the type of employers to help explain the gender salary gap.[26] A second employer characteristic of relevance to salary analysis is the region of the country in which the employer was located—though the differences between men and women on region of employment are small. These two variables accounted for $1,300 (10 percent) of the doctoral gender salary gap.

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[22] For the purposes of this presentation, we have included in the broad field of degree category a set of variables that reflect the fact that the effect of years since doctorate on salary is not necessarily the same for all degree fields. These interaction effects explain -9 percent of the salary gap, i.e., equalizing women and men on these interaction variables would lead to an increase in the salary gap. The main effect of field of degree is a 20 percent decrease in the gap. (See appendix table 5-32.)

[23] This methodology is discussed in the chapter 5 Technical Notes.

[24] "Retired" individuals are included in the present analysis only if they were working full time in April 1993.

[25] See the chapter 5 Technical Notes for information on variables excluded from the analysis because there was not a statistically significant relationship.

Type of Work

A number of variables in the SDR permit examination of gender differences in type of work performed. These include occupation, whether the occupation is closely related to the degree received, primary and secondary work activities, whether the position is a management position, the number of employees supervised directly, the number supervised indirectly, and whether the position is a postdoctoral appointment. These variables jointly explain approximately $2,000 (15 percent) of the doctoral gender salary gap. None of the individual variables within this group was responsible for more than 4 percentage points.

Life Choices

The last set of variables consists of those labeled "life choices." Jobs typically entail a number of rewards in addition to salary (such as fringe benefits and prestige) and also entail costs, such as the opportunity costs associated with the time spent on the job. Employers are likely to find that they can offer relatively low salaries to fill positions with high nonsalary rewards or low nonsalary costs. Men and women may place different values on these nonsalary aspects of jobs, and this may result in salary differentials. For example, if, on the average, women place a higher value on having a "short" work week than do men (e.g., because of greater responsibilities for child care), women may be more likely to choose positions with relatively low salaries and fewer work hours per week.[27] Although the SDR does not directly ask individuals to rate the importance of different factors in their job selection, a number of variables on the database are relevant for an understanding of these "life choices."

Variables in the "life choices" set include family-related variables—marital status; whether spouse was working full time, part time, or not at all; and whether spouse had a position requiring at least bachelor's-level expertise in the natural sciences, computer science, or engineering. Also included in this category are reasons related to why individuals took the following actions: worked outside of the field of doctorate, changed occupation or employer between 1988 and 1993, took courses following completion of the most recent degree, and took work-related workshops or other training.

The variables in this group collectively explain $1,400 (11 percent) of the doctoral gender salary gap. Seven of the 11 percentage points were accounted for by marital status (see appendix table 5-32). Women were much less likely than men to be married (63 percent compared with 83 percent); being married had a positive effect on salary.

Summary

In sum, the salary gap is substantial between men and women with science and engineering doctorates, but approximately 90 percent of the observed $13,300 gap can be accounted for by differences between men and women on the variables examined in this analysis. The most important explanatory variable is years since receiving the doctorate, a variable that explains $3,200 of the observed salary gap. A wide variety of employee, employer, and work characteristics also contribute to the explained salary gap. The remaining $1,400 (10 percent of the observed gap) that is not accounted for by the statistical analyses examined in this chapter can be interpreted as an estimate of employer preferences for different types of employees. It is important to recognize, however, that it is, at best, a rough estimate, because statistical models are never able to capture with complete accuracy the true complexity of human behavior.

Minority Scientists and Engineers[28]

With the exception of Asians, minorities are a small proportion of scientists and engineers in the United States. Asians were 9 percent of scientists and engineers in the United States in 1993, although they were only 3 percent of the U.S. population. Blacks, Hispanics, and American Indians as a group were 23 percent of the U.S. population but only 6 percent of the total science and engineering labor force.[29] Blacks and Hispanics were each about 3 percent, and American Indians were less than 1 percent of scientists and engineers. (See figure 5-1.)

Within the doctoral science and engineering labor force, the differences in representation of racial and ethnic groups are greater than is the case within the science and engineering labor force as a whole. Underrepresented minorities are an even smaller proportion of doctoral scientists and engineers in the United States than they are of bachelor's or master's scientists and engineers. Asians were 11 percent of doctoral scientists and engineers in the United States in 1993. Blacks were 2 percent, Hispanics were 2 percent, and American Indians were less than half of 1 percent of doctoral scientists and engineers. (See appendix table 5-33.)

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[26] See the chapter 5 Technical Notes for a discussion of how type of employer is measured.

[27] See Barbezat (1992) for an analysis of the relationship between gender and choices among PhD graduate students in economics who were seeking employment in 1988–1989. Most important for the present analysis was her finding that men rated the importance of salary and fringe benefits of prospective employers significantly more highly than did women.

[28] The data reported in this section include both U.S.-born and non-U.S.-born scientists and engineers unless otherwise noted.

[29] The science and engineering field in which blacks, Hispanics, and American Indians earn their degrees has a lot to do with participation in the science and engineering labor force. Blacks, Hispanics, and American Indians are disproportionately likely to earn degrees in the social sciences and to be employed in social science practice, e.g., in social work, clinical psychology, rather than in social sciences per se.

Field

Within the science and engineering labor force as a whole, the distribution of minority scientists and engineers by field differs depending on the minority group. Asians are concentrated in engineering, in computer science, and in the life and physical sciences. Black scientists and engineers are disproportionately likely to be in the social sciences and in computer science. Hispanics and American Indians do not differ greatly from whites in terms of field. (See appendix table 5-2.)

Minority women, with the exception of Asian women, are similar to white women in terms of field. Black and Hispanic women are more likely than minority men to be in computer or mathematical sciences and in social sciences and are less likely than minority men to be in engineering. Asian women, although less likely than men to be engineers, are more likely than other women to be engineers. Asian women, like Asian men, are less likely than other women to be social scientists. (See appendix table 5-2.)

Black and American Indian scientists and engineers are more likely than white, Hispanic, or Asian scientists and engineers to have a bachelor's as the terminal degree. (See appendix table 5-2.) For example, 66 percent of black scientists and engineers in the U.S. labor force have a bachelor's as the highest degree compared to 55 percent of all scientists and engineers.

Among doctoral scientists and engineers, field differences in employment follow the differences in field of doctorate noted in chapter 4. Black doctoral scientists and engineers are concentrated in the social sciences and are underrepresented in the physical sciences and engineering. Half of black doctoral scientists and engineers, but only 29 percent of all scientists and engineers, are in the social sciences and psychology. Only 11 percent of black doctoral scientists and engineers compared with 21 percent of all doctoral scientists and engineers are in physical sciences, and only 11 percent of black doctoral scientists and engineers, compared with 16 percent of the total, are in engineering. (See appendix table 5-33.) Hispanic doctoral scientists and engineers are similar to whites in terms of field.

Asians are more likely than other doctoral scientists and engineers to be in engineering and are less likely than other doctoral scientists and engineers to be in social science. Thirty-seven percent of Asians are in engineering, compared with 16 percent of all doctoral scientists and engineers, and only 10 percent of Asians are social scientists, including psychologists, compared with 29 percent of all doctoral scientists and engineers. (See text table 5-3.)

Nativity is a large influence on Asians' choice of field. U.S.-born Asians are similar to whites in terms of field. Non-U.S.-born Asians, on the other hand, as well as non-U.S.-born members of other racial/ethnic groups, are disproportionately likely to be engineers. Non-U.S.-born scientists and engineers are about twice as likely as U.S.-born scientists and engineers, no matter what racial or ethnic group, to be engineers. (See appendix table 5-33.)

Employment and Unemployment

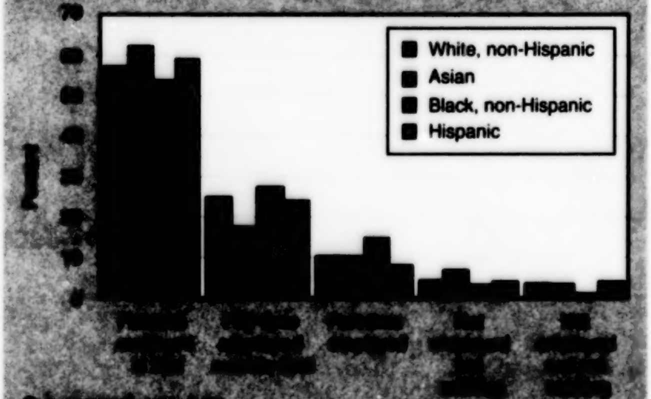
Bachelor's Scientists and Engineers

Recent minority bachelor's science and engineering graduates differ in their pursuit of postgraduation education as well as their employment status. About 30 percent of new bachelor's graduates pursue graduate study either full time or part time. Among recent bachelor's graduates, Hispanics and Asians are more likely than whites or blacks to go on to graduate school. (See appendix table 5-34.) Differences in degree field do not appear to explain this, because a high proportion of Asian graduates received degrees in engineering and a high proportion of Hispanic graduates received degrees in social sciences. In neither of these fields do a high proportion of graduates pursue graduate education.

Minority bachelor's graduates differ in postgraduation employment status as well. Asian recent graduates are less likely than other groups to be employed outside their field but are more likely to be unemployed. (See figure 5-15.) The unemployment rate for new Asian

Figure 5-15.

[illegible]



[illegible]

Text table 5-3.
Doctoral scientists and engineers in the labor force, by field of doctorate and race/ethnicity: 1993

All doctoral scientists and engineers
[Percentage distribution]

Field	Total	White, non-Hispanic	Black, non-Hispanic	Hispanic	Asian	American Indian
Total, all fields	100.0	100.0	100.0	100.0	100.0	100.0
Total, science	83.8	86.3	89.4	85.3	62.9	90.4
Physical sciences	21.4	21.4	10.9	19.5	23.6	16.3
Computer and mathematics	6.0	5.7	4.1	7.7	8.2	3.9
Life sciences	26.9	27.8	24.7	23.4	20.9	23.0
Social sciences	29.5	31.3	49.7	34.7	10.1	47.2
Engineering	16.2	13.7	10.6	14.7	37.1	10.1

U.S.-born doctoral scientists and engineers
[Percentage distribution]

Field	Total	White, non-Hispanic	Black, non-Hispanic	Hispanic	Asian	American Indian
Total, all fields	100.0	100.0	100.0	100.0	100.0	100.0
Total, science	87.6	87.4	93.5	90.6	84.0	91.2
Physical sciences	21.3	21.5	10.6	19.3	23.7	15.2
Computer and mathematics	5.5	5.6	3.7	5.2	4.1	4.1
Life sciences	28.3	28.4	25.0	25.0	34.0	22.8
Social sciences	32.4	31.9	54.5	41.2	22.4	49.1
Engineering	12.4	12.6	6.5	9.4	16.0	8.8

See appendix table 5-33.

bachelor's science and engineering graduates is 7 percent, compared with between 3 percent and 4 percent for white, black, and Hispanic graduates. (See appendix table 5-34.)

The types of jobs that new bachelor's science and engineering graduates go into are related to their fields of degree. Graduates with degrees in engineering and the physical sciences are most likely to find employment in science and engineering occupations. Eighty percent or more of full-time employed new bachelor's engineers and physical scientists are employed in their fields, compared with 55 percent of comparable social scientists. (See appendix table 5-34.) Those with degrees in the social sciences are most likely to find employment in non–science-and-engineering occupations that are related to science and engineering. For example, black and Hispanic science and engineering graduates, more than half of whom earned degrees in the social sciences, are more likely than other racial or ethnic groups to be employed in social services. (See figures 5-16 and 5-17.)

Doctoral Scientists and Engineers

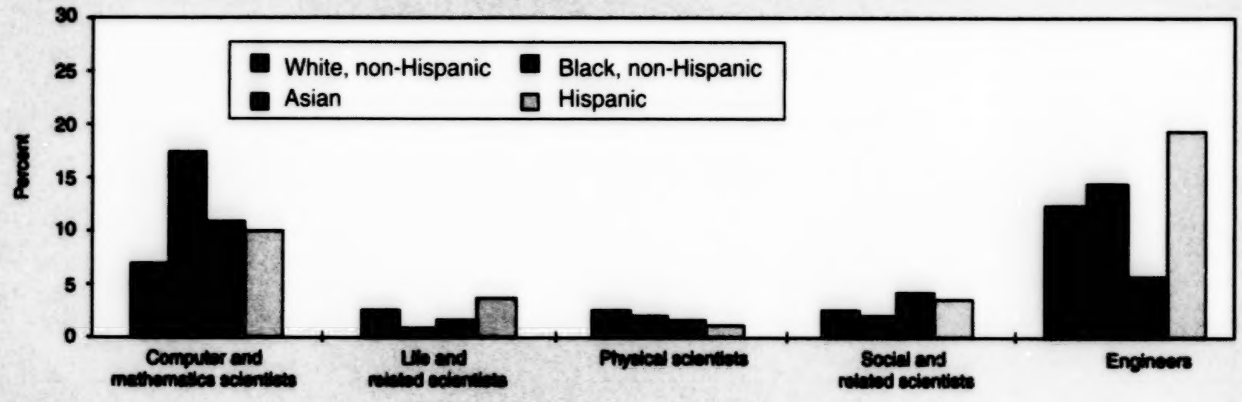
In 1993, unemployment rates of doctoral scientists and engineers by race/ethnicity did not differ significantly. (See appendix table 5-36.) The differences in unemployment were small and were consistent with what is expected from chance variations due to sampling.

Sector of Employment

Racial and ethnic groups differ in employment sector, partly because of differences in field. Among bachelor's and master's scientists and engineers, 60 percent of black, 66 percent of Hispanic, and 69 percent of Asian, compared with 73 percent of white bachelor's scientists and engineers, are employed in business or industry. (See appendix table 5-14.)

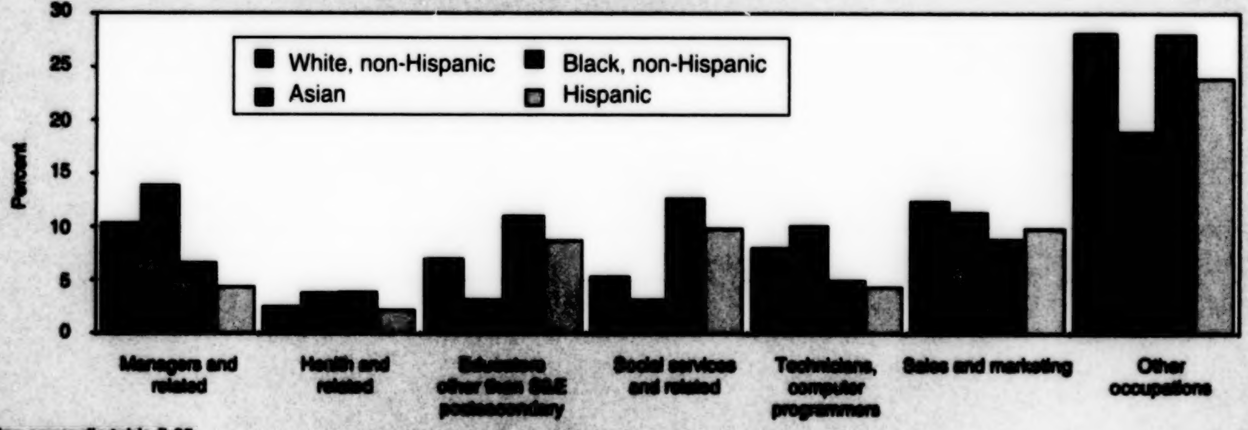
Among doctoral scientists and engineers, blacks, Hispanics, and American Indians are slightly more likely than whites to be employed in colleges and universities and in other educational sectors and are slightly less likely than whites to be employed in business or industry. (See figure 5-18.) Asians differ greatly from all the other racial or ethnic groups. They are less likely to be employed in colleges and universities and are much more likely to be employed in business or industry: 46 percent of Asians compared with 29 percent of whites are employed in industry. Partly, this can be explained by differences in field. Blacks, Hispanics, and American Indians are concentrated in the social sciences, which

Figure 5-16.
Science and engineering occupations of 1992 bachelor's science and engineering graduates, by race/ethnicity: 1993



See appendix table 5-35.

Figure 5-17.
Non-science-and-engineering occupations of 1992 bachelor's science and engineering graduates, by race/ethnicity: 1993



See appendix table 5-35.

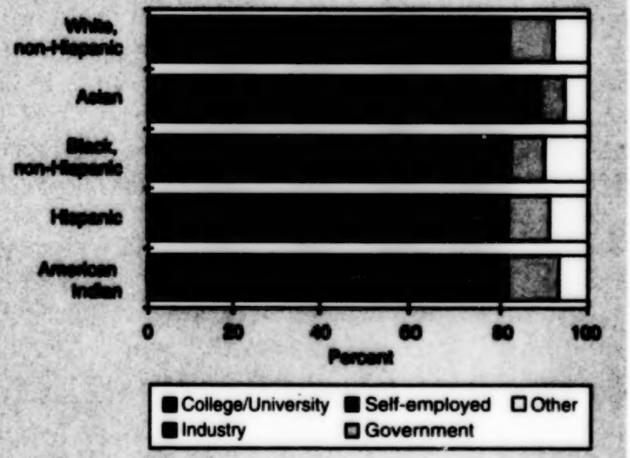
are less likely to offer employment in business or industry, and are underrepresented in engineering, which is more likely to offer employment in business or industry. Asians, on the other hand, are overrepresented in engineering and thus are more likely to be employed by private for-profit employers.

Academic Employment

Racial/ethnic groups differ in field of teaching and in academic employment characteristics. They differ in the types of institutions in which they teach, in employment status, in highest degree, in research activities, in rank, and in tenure.

Blacks are underrepresented and Asians are overrepresented among engineering faculty. Although blacks are 4 percent of science faculty, they are only 2 percent of engineering faculty. Within the sciences, black faculty are a higher proportion of social science faculty (6

Figure 5-18.
Sector of employment of doctoral scientists and engineers in the labor force, by race/ethnicity: 1993



See appendix table 5-16.

percent) than they are of other disciplines. Asians are 15 percent of engineering faculty and 5 percent of science faculty (see figure 5-19).

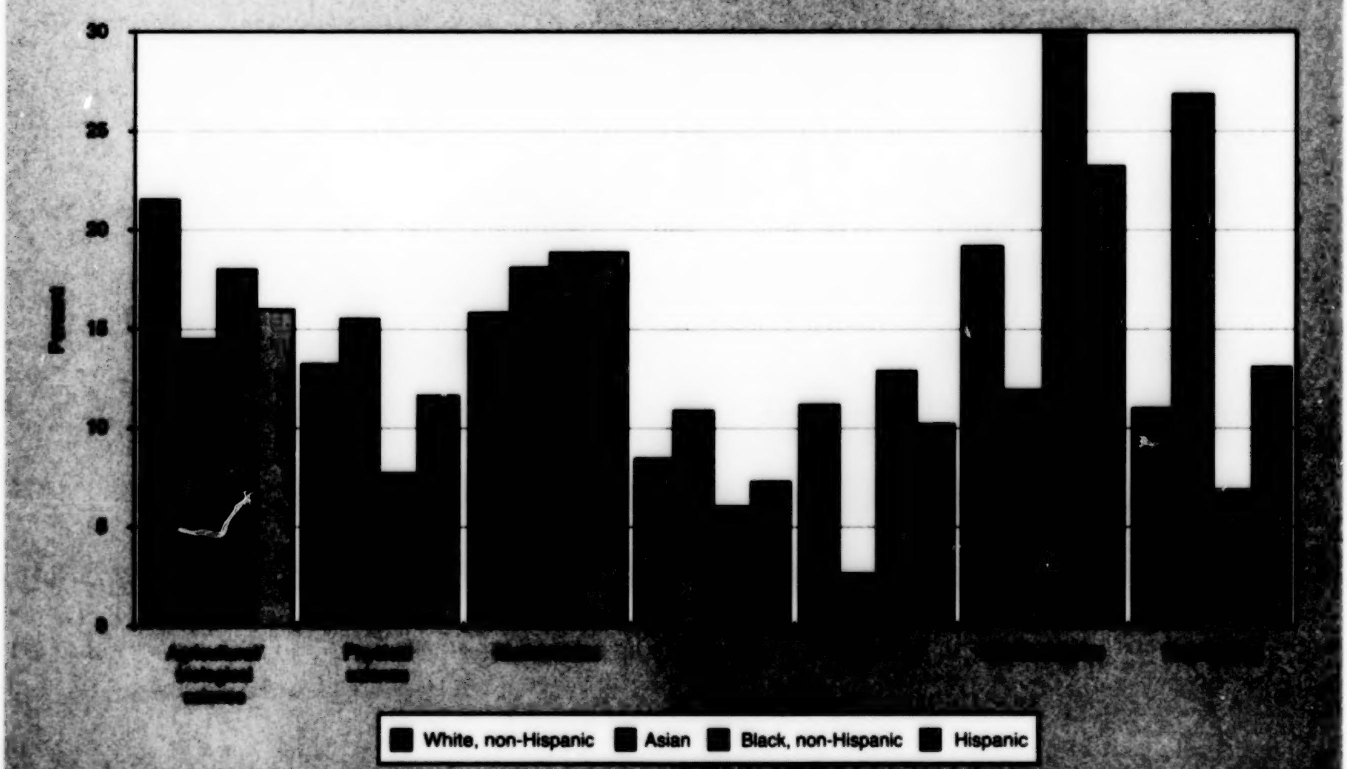
The types of schools in which racial/ethnic groups teach differ. Asian faculty are far less likely than other groups to be employed in 2-year colleges. Black faculty are less likely than other groups to be employed in research institutions and are more likely to be employed in comprehensive institutions, liberal arts schools, and 2-year colleges. (See figure 5-20.) Hispanic faculty are less likely than other groups to be employed in research institutions and are more likely to be employed in 2-year colleges.

Minority faculty also differ in research activities. Asian science and engineering faculty are far more likely than other groups to be engaged in research and to prefer spending time doing research, especially in the doctorate and comprehensive universities. (See appendix table 5-37.) They are also more likely than others to be engaged in funded research, to be principal or co-principal investigators (see appendix table 5-24), and to have published within the last 2 years—at all ages and within research universities. (See appendix table 5-38.)

Black and Hispanic faculty differ little from white science and engineering faculty in time spent in teaching or research and in preferred time in teaching or research. (See appendix table 5-38.) Black faculty, however, have fewer publications than white scientists and engineers in the previous 2 years—at all ages and in all types of schools. (See appendix table 5-37.) Black faculty are also less likely than other groups to be engaged in funded research or to be a principal investigator or co-principal investigator. (See appendix table 5-24.)

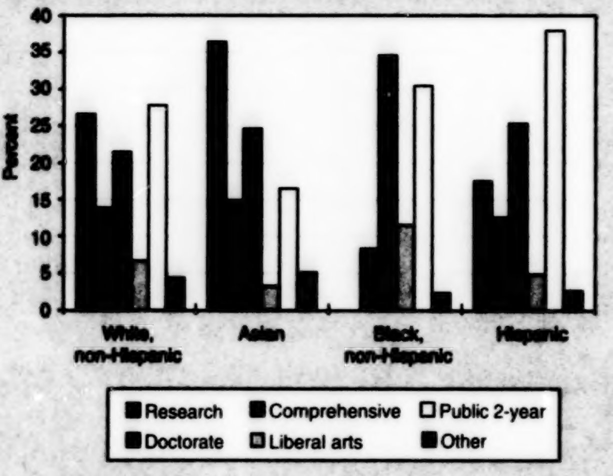
Differences in faculty rank and tenure among racial/ethnic groups exist as well. Although Asians are not underrepresented in science and engineering employment, as is the case with underrepresented minorities, they are less likely to be full professors or to be tenured. Among full-time ranked science and engineering faculty, Asians, blacks, and Hispanics are less likely than whites to be full professors. (See figure 5-21.) Forty-one percent of Asians, 33 percent of blacks, and 45 percent of Hispanics, compared with 49 percent of whites, are full professors. (See appendix table 5-27.) These differences are partly explained by differences in age. Black, Hispanic, and Asian scientists and engineers are younger on average than white and American Indian scientists and engineers. When age differences are accounted for, Asian and Hispanic faculty are as likely or more likely than white faculty to be full professors, but black faculty are still less likely than other faculty to be full professors. Among ranked faculty who received doctorates 13 or more years previously, only 58 percent of black faculty compared to 70 percent of white faculty were full professors. (See appendix table 5-27.)

Figure 5-19.
Distribution of science and engineering faculty by field and race/ethnicity: [illegible]



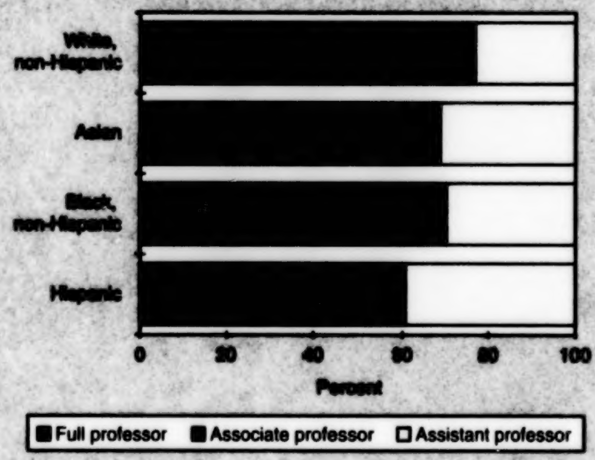
See appendix table 5-18.

Figure 5-20.
Distribution of science and engineering faculty, by type of school and race/ethnicity: 1993



See appendix table 5-19.

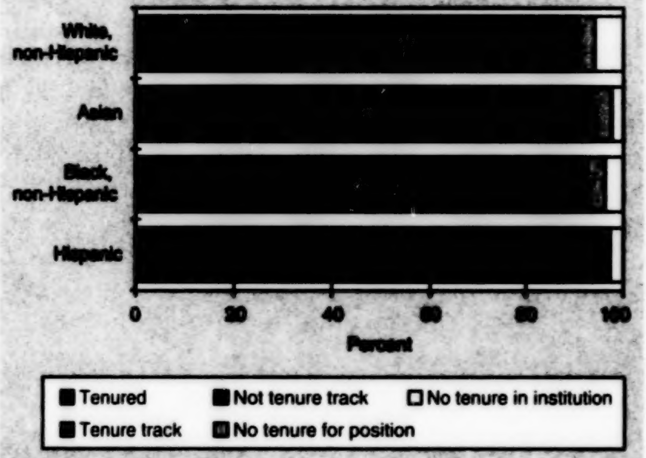
Figure 5-21.
Academic rank of full-time ranked science and engineering faculty, by race/ethnicity: 1993



See appendix table 5-27.

Black, Hispanic, and Asian faculty are also less likely than white faculty to be tenured. (See figure 5-22.) Fifty-four percent of black faculty, 52 percent of Hispanic faculty, and 57 percent of Asian faculty, compared with 64 percent of white faculty, are tenured. Black, Hispanic, and Asian faculty are more likely than white faculty to be on a tenure track. Thirty percent of black faculty, 48 percent of Hispanic faculty, and 27 percent of Asian faculty, compared with 19 percent of white faculty, are on a tenure track. (See appendix table 5-28.) Again, these tenure differences are likely to be related to age differences.

Figure 5-22.
Tenure status of full-time science and engineering faculty, by race/ethnicity: 1993



See appendix table 5-28.

Nonacademic Employment

As mentioned previously in this chapter, the majority of both bachelor's and master's scientists and engineers are employed in business or industry. Within business and industry, they are most likely to have computer applications, research and development, and management as their primary work activity. Black, Hispanic, and Asian bachelor's and master's scientists and engineers differ little from white bachelor's and master's scientists and engineers in their primary work activity. For example, 8 percent of both white and black bachelor's scientists and engineers and 9 percent of Hispanic bachelor's scientists and engineers work in applied research. Ten percent of black, 11 percent of Hispanic, and 12 percent of white bachelor's scientists and engineers are in management and administration. (See appendix table 5-39.)

A similar pattern of primary work activity is found among doctoral scientists and engineers. Black and Hispanic doctoral scientists and engineers employed in business or industry have primary work activities similar to white doctoral scientists and engineers. (See figure 5-23.) Asians, on the other hand, are much more likely than other groups to be in research and development.

Salaries

Starting Salaries

In science and engineering, the median starting salaries of new bachelor's and master's science and engineering graduates by race/ethnicity are not dramatically different. (See text table 5-4.)

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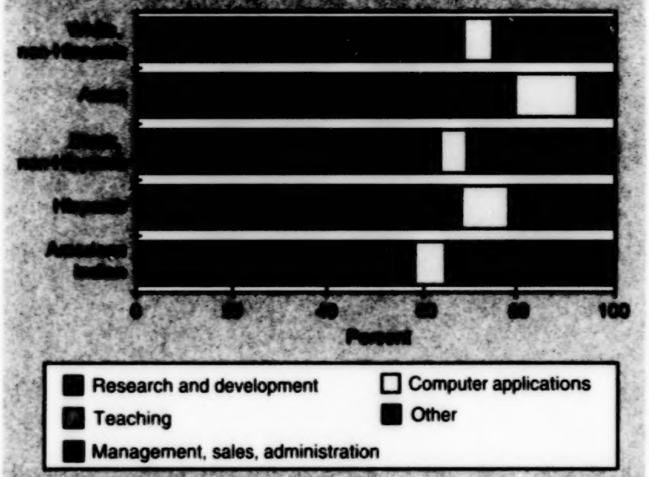

See appendix table 5-40.

Doctoral Racial/Ethnic Salary Gaps

An analysis of the differences in average salaries among racial/ethnic groups was performed analogous to that done for the gender salary gap among full-time employed science and engineering doctorate-holders.[30] Because of the relatively small number of individuals within some of the racial/ethnic groups, the results are necessarily more tentative than was the case for the gender salary gap.

The salary differences between whites and the racial/ethnic minority groups are not as large as the gender salary gap. (See text table 5-5.) The differences range from $4,100 for Asians to $7,100 for blacks. Although smaller than the $13,300 gender gap, these are not trivial differences and rightly raise the question of the extent to which these differences can be accounted for by other variables in a manner analogous to that done for the gender salary gap.

The background variables, including years since receipt of the doctorate and field of degree, explain substantial parts of the observed black/white and Hispanic/white salary gaps (35 percent and 33 percent, respectively). Adding the remaining work-related and life-choice variables to the analysis explains the remaining racial/ethnic salary gaps for blacks and Hispanics.

The analysis of the Asian/white gap shows a very different pattern than that for blacks and Hispanics. Field of degree has a strong "negative" explanatory effect on the salary gap. This indicates that when Asians and whites are statistically "equalized" on field of degree, the resulting salary gap is larger than the observed gap. This is attributable to the fact that Asians are concentrated in degree fields such as engineering that have relatively high salary levels. Employer characteristics also have a strongly negative explanatory effect. This effect largely results from Asians being relatively more likely to be employed in the private sector (47 percent of Asians are so employed compared with 29 percent of whites). (See appendix table 5-41.) After statistically equalizing Asians and whites on all variables in the analysis, the "unexplained" salary gap between Asians and whites is approximately $900 (23 percent of the observed gap).

The salary gap for American Indians and whites shows an explanatory pattern that is different from the other groups examined. The data do not indicate that American Indians have been increasing their participation in the doctoral labor force over time. Therefore, years since doctorate is not an important factor in explaining the salary gap between American Indians and

[illegible]

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[30] The methodological approach used in analyzing salary gaps is discussed in the section on gender salary gaps and in more detail in the chapter 5 Technical Notes.

Text table 5-5.
"Explained" versus observed race/ethnic salary gaps for science and engineering doctorate recipients: 1993

	Blacks (compared with whites)		Hispanics (compared with whites)		Asians (compared with whites)		American Indians (compared with whites)	
	Salary gap	% of observed gap	Salary gap	% of observed gap	Salary gap	% of observed gap	Salary gap	% of observed gap
"Explained by" adjustment factors[a]								
Years since doctorate	$2,300	32.5	$2,500	44.0	$2,700	65.2	$100	1.9
Field of degree	200	2.9	(600)	–10.9	(2,600)	–62.3	900	13.3
Other work-related employee characteristics	2,100	29.4	2,300	39.2	3,500	84.5	0	–0.0
Employer characteristics	2,500	34.7	900	16.4	(2,600)	–63.1	2,800	43.5
Type of work	(100)	–1.2	700	12.6	2,300	55.6	100	1.4
"Life choices"	700	9.8	100	2.1	(100)	–3.3	(200)	–2.8
Total "explained"	$7,700	108.0	$5,900	103.3	$3,200	76.6	$3,700	57.3
Unexplained salary gap	(600)	–8.0	(100)	–3.3	900	23.4	2,800	42.7
Observed salary gap[b]	$7,100	100.0	$5,800	100.0	$4,100	100.0	$6,500	100.0

[a] See the chapter 5 Technical Notes for an explanation of the methodology used in preparing this table.
[b] Average observed white salary: $61,700; black salary: $54,600; Hispanic salary: $56,000; Asian salary: $57,600; American Indian salary: $55,200.

NOTE: Detail may not add to total because of rounding.

SOURCE: SRS/NSF 1993 Survey of Doctorate Recipients

whites. All of the variables combined explain approximately 57 percent of the $6,500 salary gap. Thus, approximately 43 percent of the observed gap remains unexplained. For American Indians, this constitutes approximately $2,800. The reader is cautioned, however, that the number of American Indians in the sample is quite small and that these estimates must be considered fairly imprecise.[31]

Before leaving the topic of racial/ethnic salary differences, it is interesting to look at whether significant "unexplained" racial/ethnic salary gaps are evident when one looks separately at U.S.-born and non-U.S.-born individuals, since a disproportionately high percentage of minority group members in the doctoral population are born outside the United States and the decomposition of the salary gaps for U.S.-born individuals could be quite different than for those born outside of this country. Examination of the data indicates that for U.S.-born individuals, the variables examined "explain" all or almost all of the observed racial/ethnic salary gaps for all the groups examined except for American Indians. (See text table 5-6.) In fact, U.S.-born blacks and Asians have higher average salaries than would be expected, given the different racial/ethnic group characteristics on the variables examined, when compared with whites.

The relatively high salaries of U.S.-born blacks and Asians may, of course, be the result of imperfections in the model used in this analysis. It is possible, for example, that the obstacles placed in the way of minority entry into the doctoral science and engineering labor force result in those minority members who are successful being more qualified than whites on factors, such as "willingness to work hard," that we were unable to measure. Alternately, the relatively high salaries of U.S.-born blacks and Asians may indicate that employers have a preference for U.S.-born blacks and Asians—perhaps in response to affirmative action programs.

Among the non-U.S.-born, Hispanics have similar salaries to whites with similar characteristics; however, approximately $2,300 of the Asian/white and black/white gaps remain unexplained.[32]

In sum, these data do not indicate that racial/ethnic status has much effect on salary within this very "elite"

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[31] A regression analysis incorporating the demographic variables indicated that the difference between American Indians and other racial/ethnic groups could be explained by chance.

[32] Including an interaction effect between race/ethnicity and place of birth indicates the interaction is statistically significant at the 0.05 level. See the chapter 5 Technical Notes for more information on this analysis.

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Text table 5-6.
"Explained" versus observed race/ethnic salary gaps for science and engineering doctorate recipients, by birthplace: 1993

	U.S.-born								Non-U.S.-born					
	Blacks (compared with whites)		Hispanics (compared with whites)		Asians (compared with whites)		American Indians (compared with whites)		Blacks (compared with whites)		Hispanics (compared with whites)		Asians (compared with whites)	
	Salary gap	% of observed gap	Salary gap	% of observed gap	Salary gap	% of observed gap	Salary gap	% of observed gap	Salary gap	% of observed gap	Salary gap	% of observed gap	Salary gap	% of observed gap
"Explained by" adjustment factor[a]														
Years since doctorate	$1,600	34.9	$2,000	30.1	$2,300	90.4	$200	3.3	$2,500	22.1	$2,100	46.4	$1,500	34.3
Field of degree	700	14.3	100	1.9	(600)	–21.4	900	12.3	300	2.5	(300)	–6.3	(1,200)	–27.6
Other work-related employee characteristics	1,300	26.1	1,600	23.6	2,000	78.1	100	1.3	2,600	26.5	1,600	35.9	2,100	48.6
Employer characteristics	2,800	57.1	2,200	32.5	(2,300)	–91.0	2,900	40.6	2,100	18.5	(100)	–2.1	(2,000)	–45.8
Type of work	(900)	–17.3	400	6.6	1,500	57.3	100	2.0	1,300	12.1	600	[illegible]	1,800	40.4
"Life situation"	900	17.5	0	0.5	600	22.7	(200)	–2.3	400	3.5	[illegible]	6.7	(100)	–2.6
Total "explained"	$6,700	132.1	$8,400	95.2	$3,700	146.5	$4,000	57.4	$8,100	70.1	$4,400	[illegible]	$2,300	49.3
Unexplained salary gap	(1,700)	–32.1	400	4.8	(1,100)	–46.5	3,000	42.6	2,400	29.9	100	[illegible]	2,300	50.7
Observed salary gap[b]	$5,000	100.0	[illegible]	100.0	$2,550	100.0	$7,000	100.0	$11,300	100.0	$4,500	[illegible]	$4,600	100.0

[a] See the chapter 5 Technical Notes for an explanation of the methodology used in preparing this table.

[b] For U.S.-born individuals, average observed white salary: $61,700; black salary: $56,700; Hispanic salary: [illegible]; Asian salary: [illegible]; American Indian salary: $54,700. For non-U.S.-born individuals, average observed white salary: $61,500; black salary: $50,200; Hispanic salary: $57,[illegible]; Asian salary: [illegible].

NOTE: Detail may not add to total because of rounding.

SOURCE: SRS/NSF 1993 Survey of Doctorate Recipients.

population of full-time-employed individuals with doctoral science and engineering degrees when one compares groups with similar characteristics on relevant variables. After adjusting for differences in work-related characteristics, the only U.S.-born minority group with an average salary substantially lower than that of U.S.-born whites was American Indians. Because the sample contains few American Indians, however, this result may be attributable to sampling variability. For U.S.-born blacks and Asians, minority group salaries are actually somewhat higher than would be expected on the basis of the characteristics adjusted for in this analysis.

Scientists and Engineers With Disabilities

Persons with disabilities are also underrepresented in science and engineering. Comparisons of data on participation of persons with disabilities are difficult because of differences in definition.[33] It appears, however, that persons with disabilities are a smaller proportion of the science and engineering labor force than they are of the labor force in general. About 20 percent of the population have some form of disability; about 10 percent have a severe disability.[34] Persons with disabilities are 13 percent of all employed persons[35] and about 5 percent of the science and engineering labor force (see figure 5-1).

Doctoral scientists and engineers with moderate to severe disabilities make up about 5 percent of doctoral scientists and engineers in the United States. (See appendix table 5-42.) The proportion of scientists and engineers with disabilities increases with age. More than half became disabled at age 35 or later. Only 7 percent had been disabled since birth, and only one-fourth had been disabled before the age of 20. (See appendix table 5-43.)

The representation of persons with disabilities in the science and engineering population can be estimated by comparing the results of the NSF National Survey of College Graduates with similar results from the Bureau of the Census's Survey of Income and Program Participation.[36] Comparisons of the two survey results indicate that persons with significant sensory-motor disabilities are underrepresented among scientists and engineers. The Survey of Income and Program Participation found that in 1991–1992, 0.4 percent of the general population of 15-to-64-year-olds reported that they were unable to see words and letters. The comparable figure from the 1993 National Survey of College Graduates was 0.1 percent. In the total population, 0.2 percent were unable to hear normal conversations, compared with 0.02 percent of the scientists and engineers, and 1.9 percent of the general population reported being unable to lift a 10-pound bag of groceries, compared with 0.2 percent of the scientists and engineers. For those unable to climb stairs, the total population rate was 2.2 percent compared with 0.2 percent of the scientists and engineers.[37] [38]

Field of Science and Engineering

Unlike women and minorities, persons with disabilities are not particularly concentrated in certain fields (see figure 5-24), although a somewhat higher fraction of those with doctorate degrees in the social sciences have disabilities (6.6 percent) than is true of those with doctorate degrees in science and engineering as a whole (5 percent).

Employment and Unemployment

Recent Bachelor's Graduates

Recent bachelor's science and engineering graduates with disabilities are somewhat less likely than those without disabilities to enroll either full time or part time in graduate school. Twenty-six percent of 1992 bachelor's science and engineering graduates with disabilities were full-time or part-time graduate students in 1993, compared with 31 percent of comparable graduates without disabilities. (See appendix table 5-34.)

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[33] The data on persons with disabilities in science and engineering are seriously limited for several reasons. First, operational definitions of "disability" vary and include a wide range of physical and mental conditions. Different sets of data use different definitions and thus are not totally comparable. (See appendix table 1-1.) Second, data about disabilities are frequently not included in comprehensive institutional records (e.g., in registrars' records in institutions of higher education). The third limitation on information on persons with disabilities gathered from surveys is that it often is obtained from self-reported responses. Typically, respondents are asked if they have a disability and to specify what kind of disability it is. Resulting data, therefore, reflect individual decisions to self-identify, not objective measures. Finally, data users should understand that sample sizes for the population of disabled persons may be small and care should be taken in interpreting the data.

[34] Estimates of the proportion of the population with disabilities vary due to use of different definitions of "disability." See appendix A Technical Notes for a discussion of the limitations of estimates of the size of this group. The source of these estimates is the U.S. Department of Commerce, Bureau of the Census. 1993. *Americans With Disabilities: 1991–92: Data from the Survey of Income and Program Participation* (P70-33).

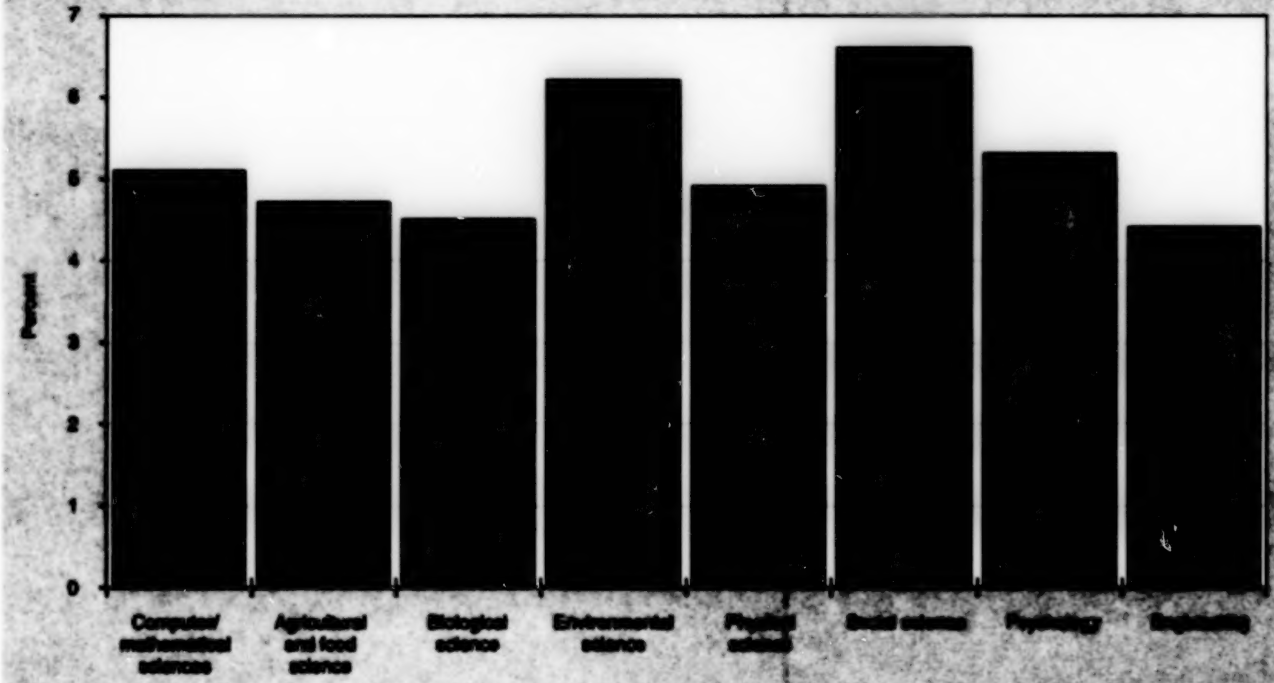
[35] U.S. Department of Commerce, Bureau of the Census. 1994. "Americans With Disabilities" (Statistical Brief SB/94-1).

[36] Because of several differences between the two surveys, comparisons can be made only for certain segments of the two populations.

[37] The question used in the National Survey of College Graduates combined stair climbing and walking, whereas the Survey of Income and Program participation asked about these two activities separately. The rate reported for the latter survey is for the activity with the higher reported disability rate.

[38] Small cell sizes restrict the analysis of types of disability to overall percentages of the science and engineering population.

Figure 5-24.
Persons with disabilities as a percentage of doctoral scientists and engineers in the labor force, by field of doctorate: 1993



See appendix table 5-42.

The unemployment rates of recent bachelor's science and engineering graduates with and without disabilities are similar. The unemployment rate for 1992 bachelor's science and engineering graduates with disabilities was 4.7 percent compared with 4.5 percent for those without disabilities. (See appendix table 5-34.)

Doctoral Scientists and Engineers

The labor force participation rates of doctoral scientists and engineers with and without disabilities are quite different. Almost one-quarter of doctoral scientists and engineers with disabilities are out of the labor force, compared with only 7 percent of those without disabilities. (See appendix table 5-36.) Among those in the labor force, persons with disabilities are more likely than those without disabilities to be unemployed or to be employed part time. The unemployment rate for doctoral scientists and engineers with disabilities was 2.4 percent compared with 1.6 percent for those without disabilities. The percentage of doctoral scientists and engineers in the labor force who were employed part time in 1993 was 11 percent for those with disabilities and 6 percent for those without disabilities. The lack of full-time employment may be particularly problematic for scientists and engineers with disabilities because those who are unemployed or employed part time are likely to have less access to health insurance.

Sector of Employment

Scientists and engineers with disabilities do not differ greatly from those without disabilities in terms of employment sector. Among bachelor's scientists and engineers, 68 percent of persons with disabilities are employed in business or industry, compared with 72 percent of those without disabilities. (See appendix table 5-14.) Among doctoral scientists and engineers, 27 percent of those with disabilities compared with 31 percent of those without disabilities are employed in business or industry. (See figure 5-25.) The fraction of doctoral scientists and engineers with disabilities who are self-employed is higher (9 percent) than the fraction of all doctoral scientists and engineers who are self-employed (6 percent).

Academic Employment

Doctoral scientists and engineers who are employed in universities and 4-year colleges and who have disabilities are more likely than those without disabilities to be full professors and to be tenured. (See figures 5-26 and 5-27.) This can be explained by differences in age. Because incidence of disability increases with age, scientists and engineers with disabilities tend to be older and to have more years of professional work experience than those without disabilities. Eighty-four percent of doctoral scientists and engineers with disabilities are pre-1985 graduates, compared to 67 percent of those

Measuring Disabilities for Persons in the Labor Force

As noted in chapter 1, there is no consensus on the definition of disabilities. This means that in examining statistics related to disabilities, it is necessary to understand the definition used in compiling the statistics.

The decennial census has two relevant questions on work-related disabilities. Individuals are considered to have a disability if they answered "yes" to the question, "Does [the person under discussion] have a physical, mental, or other health condition that has lasted for 6 or more months and which limits the kind or amount of work [the person] can do at a job?" or "yes" to a similar question indicating that the disability made the person unable to work. This definition is not adequate for current purposes for two reasons. First, individuals with what are usually regarded as significant disabilities may respond that they do not have a work disability if they regard their work as being consistent with their education and other skills. This is especially important in understanding the representation of those with disabilities in science and engineering fields, because the work is primarily intellectual. With appropriate accommodation, individuals with significant disabilities that impair their sensory functions or mobility can be highly productive and may not regard themselves as having a disability that affects their ability to work. Second, the measure does not distinguish among types of disabilities. Some disabilities (e.g., disabilities that significantly impair mental functioning) would preclude individuals from attaining the necessary skills for science and engineering employment. It is important, though not always easy, to distinguish between those with disabilities that cannot be accommodated within the science and engineering labor force and those with disabilities that can be accommodated.

To address the problems with the Census Bureau's definition of disabilities, NSF's surveys use a functional definition of disability patterned after one developed for a planned survey of individuals with disabilities developed by the Census Bureau. This measure is based on asking individuals, "What is the USUAL degree of difficulty you have with [specific tasks involving seeing, hearing, walking, and lifting]?[39] Respondents are given five choices for each response, ranging from "none" to "unable to do." Unless elsewhere noted, having a disability is defined as having at least moderate difficulty in performing one or more of these tasks. Although this definition was designed to provide a relatively objective measure of disability, it is important to note that not all disabilities are captured by this measure. For example, learning disabilities and behavioral disorders are not included.[40]

The 1991–92 Survey of Income and Program Participation (SIPP) used questions for measuring disability that are quite similar to those in the Survey of Doctorate Recipients (McNeil 1993). This provides an opportunity to make some approximate comparisons between the science and engineering doctoral population and the larger population.

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[39] The full wording of these alternatives in the survey forms is "SEEING words or letters in ordinary newsprint (with glasses/contact lenses if you usually wear them)," "HEARING what is normally said in conversation with another person (with hearing aid, if you usually wear one)," "WALKING without assistance (human or mechanical) or using stairs," "LIFTING or carrying something as heavy as 10 pounds, such as a bag of groceries."

[40] Additional measures of types of disability were omitted from the surveys due to practical limitations. The disability questions included in the questionnaires were considered burdensome and intrusive by many respondents. The surveys designers were concerned that additional questions in this area would have a serious negative impact on the overall response rates and the validity of the survey. This would be especially true if the surveys requested information on highly sensitive disabilities.

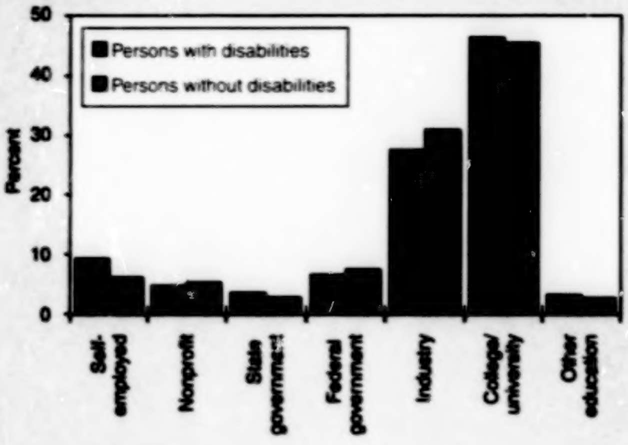
without disabilities. (See appendix table 5-44.) Among pre-1985 graduates, the differences in rank and tenure status between persons with disabilities and persons without disabilities are narrower. For example, 59 percent of doctoral scientists and engineers with disabilities who received their doctorate prior to 1985 are full professors compared with 54 percent of comparable doctoral scientists and engineers without disabilities. (See appendix table 5-44.)

Nonacademic Employment

The type of work that bachelor's-level and master's-level scientists and engineers with disabilities do is not greatly different from the type of work done by those without disabilities. The primary work activity of 27 percent of bachelor's scientists and engineers with disabilities is computer applications, compared with 29 percent of those without disabilities. Design of equipment is the primary work activity of 15 percent of bachelor's scientists and engineers both with and without disabilities. Ten percent of bachelor's scientists and engineers with disabilities and 11 percent of those without disabilities are in management and administration. (See appendix table 5-39.)

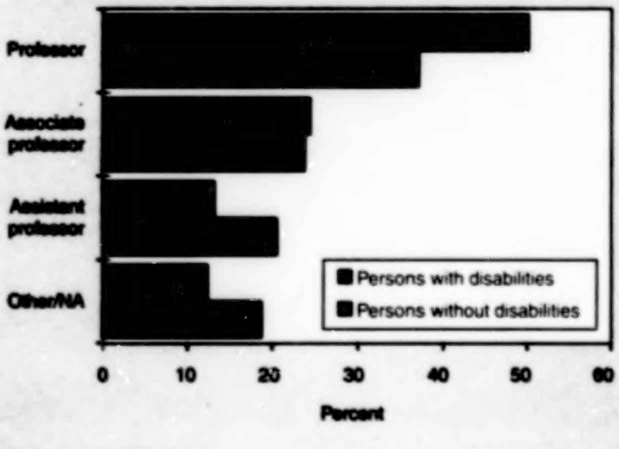
Among doctoral scientists and engineers, those with disabilities are more likely than those without disabilities to be in management. (See appendix table 5-45.) Doctoral scientists and engineers with disabilities are

Figure 5-25.
Sector of employment of doctoral scientists and engineers in the labor force, by disability status: 1993



See appendix table 5-16.

Figure 5-26.
Academic rank of doctoral scientists and engineers in universities and 4-year colleges, by disability status: 1993



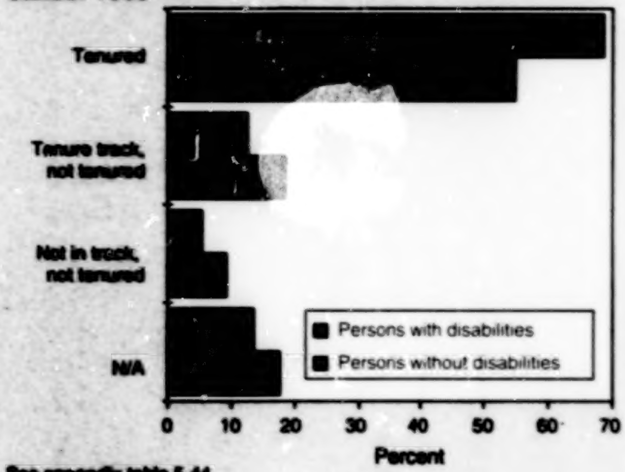
See appendix table 5-44.

older, on average than those without disabilities and thus are more likely to be in management. Among doctoral scientists and engineers age 45 and older and employed in business or industry, 32 percent of both those with disabilities and those without disabilities are in management. (See appendix table 5-45.)

The Disability Salary Gap

The Survey of Doctorate Recipients also permits an examination of the salary gap between persons with and without disabilities, comparable to that done for gender and racial/ethnic groups.[41] For the purpose of this analysis, individuals who were disabled by the time of receiving their doctorate degrees were differentiated from those who became disabled subsequent to receiving the degree.[42] This differentiation reflects the fact that the challenges faced by individuals who become disabled after earning their degrees may be different from the challenges faced by individuals who acquire a disability earlier in life.

Figure 5-27.
Tenure status of doctoral scientists and engineers in universities and 4-year colleges, by disability status: 1993



See appendix table 5-44.

The observed salary gaps between individuals with disabilities and those without were indeed quite different for those who had disabling conditions at the time of degree and for those who became disabled at a later point. Those in the first group had average salaries approximately $1,600 lower than those without disabilities, whereas those in the latter group had salaries that were $5,700 higher than those without disabilities. (See text table 5-7.) Individuals with late-acquired disabilities, however, are also considerably older than individuals without disabilities. The average length of time since receiving the doctorate was 22 years for those disabled after receiving a degree compared to 14 years for those without a disability and 15 years for those who had a disability by the time they received their doctorates. (See appendix table 5-32.) Adjusting for this difference in time since receipt of the degree explains almost all (85 percent) of the salary advantage of those with late-acquired disabilities compared to those without disabilities.

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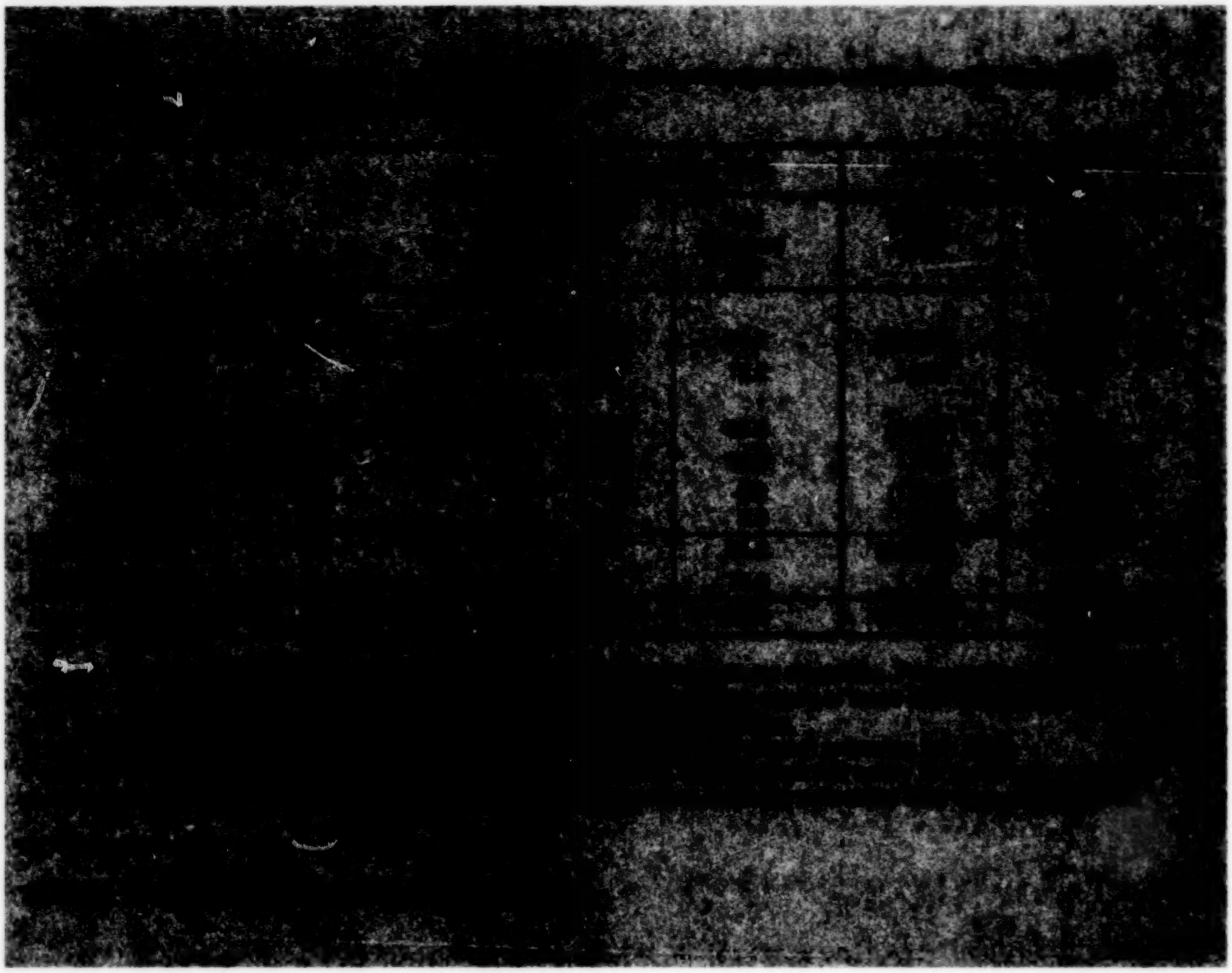
[41] The methodological approach used in analyzing salary gaps is discussed in the section on gender salary gaps and in more detail in the chapter 5 Technical Notes.

[42] See the box on page 86 for the definition of disability used here. Note that it would be possible to classify individuals by the type of their disability (seeing, hearing, walking, lifting) instead of by the age at which they became disabled, but small sample sizes precluded our using both classifications simultaneously. A regression analysis including both type of disability and age of disability indicated that age of disability was the more important determinant of salary.



Other work-related employee characteristics also explain a substantial part (54 percent) of the salary gap between those with late-acquired disabilities and those without disabilities. Most of this difference is attributable to differences between the two groups in the number of years of full-time work experience. (See appendix table 5-32.)

After all of the variables included in the analysis are controlled for, unexplained salary gaps of approximately $1,100 are observed for both groups of persons with disabilities when compared with those without disabilities. Thus, among individuals with doctoral degrees in science and engineering, this rough estimate of the salary disadvantage of having a disability appears to be similar in size to the salary disadvantage of being female.

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Technical Notes

Decomposition of Salary Gaps[43]

Introduction

To examine the issue of salary equity, statistical techniques are used that permit a more comprehensive approach than is possible using the cross-tabulation approach used in most of this report. Although these techniques are widely used in the scientific literature in analyzing similar issues, it should be noted that the techniques used do have some disadvantages when compared with the cross-tabulation approach. Most important, they require the researcher to make a number of "simplifying assumptions." If these assumptions are correct (or approximately correct), the estimates of the salary gaps "explained" by differences in group characteristics are likely to be superior to those obtained by examining cross-tabulations. If the assumptions are far from being correct, however, the researcher may end up with conclusions that are erroneous.

Sample

Data from the 1993 Survey of Doctorate Recipients (SDR) were used in the decomposition of salary gaps in chapter 5. Part-time employees and self-employed individuals were excluded from the analysis, because salary data for these individuals are not likely to be comparable to those for individuals who are employed full time. Approximately 31,100 cases were usable for the analysis.

Basic Statistical Methodology

The first step in the analysis of the salary gaps was to fit a single least-squares regression equation to the total eligible sample, using log salary as the dependent variable and using as independent variables a large number of variables from the SDR. The demographic variables of interest (gender, race/ethnicity, whether U.S.-born, and disability status) were excluded from the equation. Those independent variables that did not have a statistically significant relationship with salary (at the 0.001 level) were deleted from further consideration at this stage.[44] This relatively high level for exclusion was selected, primarily because the large sample size resulted in a large array of statistically significant variables. Even at this conservative level, the number of variables retained makes comprehension of the model difficult.[45]

The parameters of the reduced regression equation were used to decompose the salary gaps of interest, using a modification of the Oaxaca (1973) methodology frequently used for decomposing salary gaps. In this revised methodology, the proportion of a salary gap explained is considered to be equal to:

$$b_t(\overline{X}_1-\overline{X}_2)$$

where b_t is the vector of parameters from the reduced regression equation, $\overline{X}_1$ is the vector of means for the nominority group of interest (i.e., men, whites, U.S.-born whites, non-U.S.-born whites or persons without disabilities) and $\overline{X}_2$ is the vector of means for the corresponding minority group of interest.

Current Methodology Compared With Alternate Approaches

The current methodology deviates from the Oaxaca methodology in the selection of the regression equation used for standardization. We have standardized to the regression equation for the total population, whereas the most common application of the Oaxaca methodology is to standardize to the equation for the nonminority group (i.e., using b_1 instead of b_t in the above equation).

We opted to use the regression equation for the total population rather than the nonminority group for three reasons. First, using the total population is consistent with the null hypothesis that no discrimination on the basis of demographic characteristics occurs; this is, of course, the primary null hypothesis of interest.[46] Second, when multiple overlapping groups are considered (i.e., groups based on gender, race/ethnicity, birthplace, and disability status), the Oaxaca approach is conceptually more confusing than that adopted. Do we, for example, use the regression coefficients for men when comparing women with men and use the regression coefficients for whites for the analysis of racial/ethnic groups, or do we compare all of the groups to U.S.-born white men without disabilities? If the latter, does it make sense to compare all women to U.S.-born white men without disabilities or must we consider all 60 groups formed by cross-classifying the demographic variables of interest? Third, by using the same regression equation for all of the decompositions, meaningful comparisons of the salary gaps between different groups are more easily made, e.g., comparisons of the gender salary gap with the black/white salary gap.

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[43] Individuals with questions on the methodology employed are encouraged to contact Carolyn Shettle, Division of Science Resources Studies, Room 965, 4201 Wilson Boulevard, Arlington, VA 22230; (703) 306-1780; cshettle@nsf.gov. For background information on salary regression models and on variables used in this model, see Shettle (1972), Blinder (1973), Centra (1974), Kennedy (1992), Kahn (1993), and Wright (1994).

[44] When multiple dummy variables were derived from a single categorical variable, the 0.001 criterion for retention was applied to the entire categorical variable.

[45] See appendix table 5-46 for a list of the variables included in the final regression model along with estimates of the regression coefficients for the variables retained and their standard errors.

[46] This is analogous to using a pooled estimate of a proportion in calculating the standard error for the difference between two proportions, when testing the null hypothesis that the difference between two proportions is equal to 0.

To determine the sensitivity of the analysis to the choice of the regression equation used for standardization, a Oaxaca-type decomposition was made for the gender salary gap. The total percentage explained, standardizing to the equation for men rather than the total equation, was 88 percent rather than 90 percent—a fairly trivial difference. Yet another alternative is to standardize to the minority group equation.[47] Using this approach for the gender salary gap led to an estimated total percentage explained of 80 percent. Although this latter alternative provides a substantially lower estimate than that obtained for the model selected, standardization to the minority group equation is not a commonly accepted procedure.

Another approach to estimating the impact of demographic variables on salary is to do a multiple regression analysis, using dummy variables to measure the demographic groups of interest. This approach is used less frequently in the literature than is the Oaxaca approach. This approach does permit examination of the effects of each of the demographic variables of interest, however, while controlling for the other demographic variables of interest. It also has the advantage of permitting tests of significance for the effects of the demographic variables on salary and permits examination of specific interactions of interest. This approach was, therefore, used to supplement the basic decomposition approach used in the report. The parameter estimates and standard errors for this equation are included in appendix table 5-46.[48]

Variable Selection

As noted in the text, the adequacy of the analysis is contingent, in large part, on the independent variables used in the analysis. If major variables are omitted, the estimate of how much of the salary gap is "explained" will be inaccurate. Similarly, if variables that are not truly explanatory factors are included, the model will be inadequate.

As discussed in the text, some variables that could have influenced salaries (such as measures of productivity and direct measures of the relative importance of salary to other job rewards) were not collected in the SDR. Other variables were excluded for theoretical reasons or because the empirical evidence indicated that they were not, in fact, determinants of salary.

Among the available variables that were omitted for theoretical reasons, the most controversial decision was the decision to exclude academic rank and tenure. A number of analyses of the academic labor market include these variables; however, they are not always included.[49] We believe that academic rank and tenure are themselves best viewed as rewards for work performed rather than as "control" variables that help explain the salary gap.[50] To obtain an understanding of how sensitive the findings are to this particular decision, the doctoral gender salary gap was decomposed with the inclusion of academic rank and tenure in the model. The inclusion of these two variables resulted in an estimate of the explained gender gap of 91 percent rather than the 90 percent observed in the model used in chapter 5. It is thus unlikely that their inclusion would have substantially altered the findings in the chapter.[51]

We also excluded from consideration for theoretical reasons whether pay, job unavailability, or layoffs were factors in taking a job outside of the field of degree or in changing jobs. We believe that such responses may be more indicative of events that directly affect salary than they are of life choices. For example, if women and men were equally interested in being promoted, but men were promoted more often than women, men would more frequently report job changes for pay and promotion.

Note that one could argue that some of the variables included also should have been excluded. For example, one can argue that differences between groups with respect to management activities may be reflective of "discrimination" in the labor market. To the extent that this is true, one can argue that the inclusion of these variables has artificially increased the amount explained by the model.

The variables excluded for lack of statistical significance at the 0.001 level were

- *Background variables:* mother's education, father's education, and whether the individual lived in a rural area during the time he or she was growing up;
- *Other work-related employee characteristics:* type of work-related training (none, management or supervisor training, technical training, general training, or other training) received during the last year, the number of years of part-time work experience, whether the person has ever had foreign research experience, and whether the person changed employers between 1988 and 1993;

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[47] Barbezat (1991) used this approach in addition to using the Oaxaca approach.

[48] Demographic variables presented in this appendix table were included for those demographic variables that had a statistically significant impact on salary at the 0.05 level. Excluded for lack of statistical significance were type of disability (seeing, hearing, walking, and/or lifting) and interaction terms between race and gender and between race, gender, and whether born in the United States.

[49] See Barbezat (1991) for a discussion of this issue.

[50] See Weiler (1990) for a discussion of this issue.

[51] The coefficients for this model are included in appendix table 5-46. Analysts interested in performing a more detailed analysis of the salary gap based on this model can download the relevant appendix tables in spreadsheet format through the Science Resources Studies' Web site (http://www.nsf.gov/sbe/srs/stats.htm) or can obtain copies of the spreadsheets by contacting Carolyn Shettle (703-306-1780, cshettle@nsf.gov).

- *Employer characteristics:* whether the academic institution was a public or a private institution;[52]
- *Type of work:* whether the person worked in a field in which licensing was required, whether the position was a supervisory position, and for management positions, whether the position requires technical expertise in the natural sciences, mathematics or computer science, or engineering and whether it requires expertise in the social sciences;
- *Life choices:* number of children in the home by age category of the children (under age 6, 6–11, 12–17, and age 18 and older), whether spouse had a position that required expertise in the social sciences equivalent to that obtained with a bachelor's degree in the social sciences, and whether spouse had a position that required bachelor-level expertise in a non–science-and-engineering field. A number of the variables related to reasons for job and educational actions were also eliminated for lack of statistical significance.

Finally, some variables that would have required extensive recoding were not included because of time constraints. In making these decisions, the amount of time needed to recode the variable was weighed against the likelihood of the recoding making a significant difference in the analysis. For example, with a modest amount of effort, it would have been possible to categorize field of degree for those who obtained a degree subsequent to the doctorate. The most important fields for such a break-out, however, are indicated by the type of degree, because over half of individuals with additional degrees had degrees that indicate the field of study (MBA, M.D., and the law degrees). On the other hand, productivity measures that would have been very interesting to include would require an extensive amount of matching of data files with citation indices.

Variable Measurement

The measurement of most of the variables in this analysis was quite straightforward, given the basic coding structure of the SDR.[53] In a few cases noted below, however, some modifications to the coding need to be explained.

Salary: In the 1993 SDR, individuals were asked to report their salary or earned income for their primary job, using whatever unit (e.g., hour, week) preferred. These have been annualized on the SDR database using appropriate inflators (e.g., 2,080 times hourly wage, 52 times weekly wage). It is difficult, however, to know what the correct inflator is for academic year. The 1993 database did not inflate academic year salaries, whereas previous SDR surveys used an inflator of 11/9. The first option is tantamount to assuming that the individual does not work in the summer, and the second assumes that the individual has a typical research grant that pays 2/9 of his/her academic year salary. Although both approaches are somewhat arbitrary, using the 11/9 estimator is the more reasonable approach and is roughly comparable to multiplying a weekly wage by 52 under the assumption that the worker is employed all year.

The dependent variable in the regression analysis is the logarithm of salary, which is often used in analyzing salary, because it is consistent with the concept that salary increases are typically expressed as percentage increases rather than in absolute dollars.[54] Because the log of salary was used as the dependent variable in the regression equations, the average salaries presented in the chapter are geometric means.[55] Like the median, the geometric mean places less emphasis on extremely high values in the calculation of the average, so that the geometric means for salary will normally be lower than the mean.

Years since receipt of doctorate, age at PhD, years of full-time experience, and years of part-time experience: The model fitted included squared terms for age when the doctoral degree was received, years since receiving the doctorate, years of full-time experience, and years of part-time experience in addition to the linear terms for these variables. Incorporation of such squared terms is common in the literature (cf. Weiler 1990). Its use was also verified through visual inspection of the graphed relationships between salary and these variables and by verifying that the squared terms were statistically significant at the .001 level when incorporated into the model after inclusion of the linear terms. It should be noted that a quadratic formulation is consistent with the idea that salary may decline toward the end of one's career.

In addition to these variables, it would have been interesting to include a measure of time not in the labor force in the model, but the 1993 SDR does not include a direct measure of this.

Occupation: Occupation was measured, using NSF's standard detailed coding of occupations except for a split of non–science-and-engineering occupations into "low" and "high" status occupations[56] on the basis of information from the 1993 National Survey of College Graduates (NSCG). Non–science-and-engineering occupations were classified in the "low status" category if fewer than 10 percent of the NSCG respondents in the occupation had doctorate degrees and if the average salary of NSCG respondents in the occupation in 1993 was under $45,000.

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[52] This variable was close to being statistically significant. Note also that Formby et al. (1993) found this variable to be important among highly ranked economics departments.

[53] Individuals wishing a copy of the SDR code book or more information on variable coding should contact Carolyn Shettle (703-306-1780, cshettle@nsf.gov).

[54] See, for example, Barbezat (1991), Broder (1993), and Formby et. al. (1993).

[55] A geometric mean for a variable is the antilogarithm of the mean of the logarithms of the individual observations on that variable.

Type of employer: The SDR contains two highly related variables that describe the type of employer—sector of employment and, for those in academia, Carnegie classification of employer. Sector of employment in the SDR is based on individuals' self-report of the sector to which they belong, using the following categories: 2-year college; 4-year college; medical school; health-related school other than medical school; university-affiliated research institute; other educational institution; elementary, middle, or secondary school; private for-profit company; private not-for-profit organization; local government; State government; U.S. military service; U.S. Government (civilian employee); and other employer type.[57] The Carnegie classification of academic institutions is a commonly used classification of postsecondary institutions, based on level of degree awarded, fields in which degrees are conferred and, in some cases, enrollment, Federal research support, and selectivity of admissions criteria. It was not possible to include dummy variables for all categories of both of these variables in the regression analysis, because the high correlations between some of the sector variables and some of the Carnegie classification variables led to severe multicollinearity problems. After deletion of redundant measures, a set of dummy variables remained that are not strictly mutually exclusive but collectively describe the type of employer.

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[56] The occupations included in the "low status" group included science-related fields such as technologists and technicians and computer programmers as well as occupations such as clerical/administrative support and precollegiate teachers/professors, and mechanics and repairers.

[57] Although the question permits individuals to classify themselves as self-employed, self-employed individuals were excluded from the current analysis.

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APPENDIX A

TECHNICAL NOTES

General Information

The data in this report come from many sources, including surveys conducted by Federal and State agencies and by professional associations. The data reflect many methods of collection, such as universe surveys, sample surveys, and compilations of administrative records. Users should take great care when comparing data from different sources. Data often will not be strictly comparable due to differences in definitions, survey procedures, phrasing of questions, and so forth.

Survey accuracy is determined by the joint effects of "sampling" and "nonsampling" errors. Sampling errors arise because estimates based on a sample will differ from the figures that would have been obtained if a complete census had been taken.

All surveys, whether universe or sample, are also subject to nonsampling errors, which can arise from design, reporting, and processing errors as well as errors due to faulty response or nonresponse. These nonsampling errors include respondent-based events such as some respondents interpreting questions differently from other respondents; respondents making estimates rather than giving actual data; and respondents unable or unwilling to provide complete, correct information. Errors can also arise during the processing of responses, such as faulty imputation or reweighting to adjust for nonresponse, and recording and keying errors.

Racial/Ethnic Information

Data collection and reporting of the race/ethnicity of individuals pose several additional problems. First, both the naming of population subgroups and their definitions have often changed over time. Because this report draws on data from many sources, different terminology may have been used to obtain the various statistics presented here. Efforts have been made to maintain consistency throughout this text, but in some data reporting, it has been necessary to use distinct terminology that does not match other compilations.

Second, many of the groups of particular interest are quite small, so that it is difficult to measure them accurately without universe surveys. In some instances sample surveys may not have been of sufficient scope to permit calculation of reliable racial/ethnic population estimates, so that results are not shown for all groups. In addition, the reader is cautioned that it is easy to overlook or minimize the heterogeneity within subgroups when only a single statistic is reported for the total racial/ethnic group.

Information About Persons With Disabilities

The data on persons with disabilities in science and engineering are seriously limited for several reasons. First, the operational definitions of "disability" vary and include a wide range of physical and mental conditions. Different sets of data have used different definitions and thus are not totally comparable. The Americans with Disabilities Act of 1990 (ADA) encouraged progress toward standard definitions. Under the ADA, an individual is considered to have a disability if the person has a physical or mental impairment that substantially limits one or more of the major life activities, has a record of such impairment, or is regarded as having such an impairment. The ADA also contains definitions of specific disabilities. (See appendix table 1-1.)

Second, data about disabilities frequently are not included in comprehensive institutional records (e.g., in registrars' records in institutions of higher education). If included at all in institutional records, such information is likely to be kept only in confidential files at an office responsible for providing special services to students. Institutions are unlikely to have information regarding any persons with disabilities who have not requested special services. In the case of elementary/secondary school programs receiving funds to provide special education, however, counts for the entire student population identified as having special needs are centrally available.

The third limitation on information on persons with disabilities gathered from surveys is that it often is obtained from self-reported responses. Typically, respondents are asked if they have a disability and to specify what kind of disability it is. Resulting data, therefore, reflect individual perceptions, not objective measures.

Finally, data on persons with disabilities are often derived from sample surveys whose main purpose is to derive estimates for a full population. Deriving estimates for any phenomenon that is applicable to a small proportion of the total is particularly difficult, especially when the sampling procedures do not have a way to "oversample" cases providing the characteristic of interest. Because persons with disabilities constitute a relatively small portion of the population, sample sizes may not be sufficiently large to permit calculation of reliable estimates.

An example in which these factors come together can be seen in the attempt to provide estimates of the proportion of the undergraduate student population with disabilities. Self-reported data from the undergraduate student population, queried on a survey to ascertain patterns of student financial aid, suggest that about 10 percent of the undergraduate population report having some disability; estimates from population surveys of higher education institutions, in contrast, place the estimate much lower, between 1 and 5 percent. Whether this discrepancy is the result of self-perception, incomplete reporting, nonevident disabilities, or differing definitions is difficult to ascertain.

Therefore, although considerable information is available on persons with disabilities and their status in the educational system and in the science and engineering workforce, it is often not possible to compare the numbers of persons with disabilities from different sources.

Primary Sources

Current Population Reports, P70-33: *Americans With Disabilities: 1991–92*

Contact:
Current Population Reports
Bureau of the Census
U.S. Department of Commerce
Washington, DC 20233
Tel: (301) 763-8300

This report presents data on the disability status of the noninstitutionalized population of the United States. The source of the data is a combined sample from the 1990 and 1991 panels of the Survey of Income and Program Participation. A supplement containing an extensive set of questions about disability status was included as part of the sixth wave of the 1990 panel and the third wave of the 1991 panel. Both of these waves were fielded between October 1991 and January 1992. The total sample size for this study was approximately 30,000 interviewed households. Estimation procedures were used to inflate weighted sample results to independent estimates of the civilian noninstitutional population of the United States.

Twelve questions were used to determine disability status for this study. These concerned the presence of limiting conditions such as difficulty with sensory and physical functional activities; difficulty with activities of daily living; the existence of specific conditions such as dyslexia, developmental disabilities, or other mental or emotional conditions; and the presence of a physical, mental, or other health condition limiting the kind or amount of work or housework that the person can do. For children, additional questions asked, for example, whether the children had received therapy or diagnostic services, had limitations in their ability to do regular schoolwork, or had a long-lasting condition that limited their ability to undertake activities such as walking and running. A person was considered to have a disability if the individual was identified affirmatively by any of the 12 category questions.

National Assessment of Educational Progress, 1969 to 1992

Contact:
National Center for Education Statistics
U.S. Department of Education
555 New Jersey Avenue, NW
Washington, DC 20208-5653
Tel: (202) 219-1761
Fax: (202) 219-1751

The National Assessment of Educational Progress (NAEP) is sponsored by the National Center for Education Statistics (NCES) and has been conducted since 1983 by the Educational Testing Service. The overall goal of the project is to determine the Nation's progress in education. Accordingly, NAEP encompasses a series of national sample surveys designed to assess students in 10 subject areas such as reading, mathematics, science, writing, and history. Begun in 1969, NAEP was conducted annually through 1980; since 1980 the project has been conducted biennially. NAEP has surveyed the educational accomplishments of 9-, 13-, and 17-year-old students (and, in recent years, those in grades 4, 8, and 12 as well). Over the years, NAEP has undergone extensive changes both in survey methodology and in the assessment areas covered, to reflect changing informational needs and possible changes in education achievement.

Since 1986, NAEP has included both main and long-term trend assessments. Both assessments use a complex multistage stratified sample of schools, selected to ensure adequate representation of schools with high enrollment of blacks and Hispanics. Both excluded students with limited English proficiency and students receiving special education services who were mainstreamed less than 50 percent of the time.

The 1992 main assessment estimated student achievement at a cross-sectional point in time. The cross-sectional samples used innovations in assessment methodology and populations definition. Approximately 1,200 schools and 26,700 students participated. Student response rates ranged from 81 percent of students in grade 12 to 93 percent of students in grade 4.

The 1992 long-term trend assessment estimated the current status of achievement using the same sampling and assessment methodology used in previous years. Approximately 17,600 students in the combined age/grade level were tested in mathematics and in science. School response rates for the grade levels examined in 1992 ranged from 82 to 88 percent. Student response rates ranged from 83 to 94 percent.

American College Testing Program

Contact:
The American College Testing Program
2201 North Dodge Street
P.O. Box 168
Iowa City, IA 52243
Tel: (319) 337-1510

The American College Testing (ACT) Assessment is taken by college-bound high school students who request that the results be sent to designated colleges and scholarship boards. The ACT is designed to measure educational development in the areas of English, mathematics, social studies, and natural sciences. The test results are used in part to help predict how well students might perform in college. In 1994, approximately 892,000 students took the ACT examinations.

ACT standard scores are reported for each subject area on a scale from 1 to 36. A composite score is obtained by taking the simple average of the four standard scores and is an indication of a student's overall academic development across the four subject areas.

Since the 1984–1985 school year, national norms have been based on the most recent ACT test scores available from all students taking the test and who are scheduled to graduate in the spring of the year.

It should be noted that college-bound students who take the ACT Assessment are not, in some respects, representative of college-bound students nationally. First, students who live in the Midwest, South, and Rocky Mountains and Plains regions are overrepresented among ACT-tested students compared with college-bound students nationally. Second, ACT-tested students tend to enroll in public colleges and universities more frequently than do college-bound students nationally.

Scholastic Aptitude Test (SAT)

Contact:
College Entrance Examination Board
Educational Testing Service
Princeton, NJ 08541
Tel: (609) 771-7600

The Admissions Testing Program of the College Board comprises a number of college admissions tests, including the Scholastic Aptitude Test (SAT). The SAT is taken by students who need the results to apply to a particular college or university or scholarship board. High school students participate in the testing program as sophomores, juniors, or seniors—some more than once during these 3 years. If they have taken the tests more than once, only the most recent scores are tabulated.

The SAT reports subscores in the areas of mathematics and verbal ability. Students may also elect to take Achievement Tests in any of 21 subject areas; these exams are generally taken by students who are applying to the more competitive schools. In 1994, approximately 1.1 million students took the SAT examination, and more than 200,000 took at least one Achievement Test.

In 1987 the College Board initiated a review of the Admissions Testing Program and made significant changes in the SAT Program in 1993–94. Through the January 1994 test administration, SAT Program tests included the SAT, the Test of Standard Written English (TSWE), and the Achievement Tests. Beginning in March 1994, the SAT program was revised into two formats: the SAT I: Reasoning Test (the mathematical and verbal sections, with revisions beginning in March 1994) and SAT II: Subject Tests (formerly known as the Achievement Tests, with the revisions beginning in May 1994).

The SAT results are not representative of high school students or college-bound students nationally since the sample is self-selected. In addition, public colleges in a number of states require that students applying for admission submit ACT scores rather than SAT scores; thus, the proportion of students taking the SAT in some states is very low.

The 1994 National Norms Study of the Cooperative Institutional Research Program

Contact:
Higher Education Research Institute
Graduate School of Education
University of California
320 Moore Hall
Los Angeles, CA 90024-1521
Tel: (310) 825-1925
Fax: (310) 206-2228

This series, initiated in 1966, provides national normative data on the characteristics of students attending American colleges and universities as first-time, full-time, first-year students. The series is a project of the Cooperative Institutional Research Program (CIRP), a national longitudinal study of the American higher education system sponsored by the American Council on Education and the Graduate School of Education at the University of California, Los Angeles.

Since 1972, the CIRP freshman surveys have been conducted by the Higher Education Research Institute at the University of California, Los Angeles. The 1994 CIRP freshman norms are based on the responses of

237,777 students at 461 of the Nation's 2- and 4-year colleges and universities, statistically adjusted to reflect the responses of the 1.5 million first-time, full-time students entering college as freshmen in fall 1994.

The 1994 Student Information Form is a student self-report questionnaire composed of 39 multiple choice items. The questionnaire obtains data from students in eight areas: academic skills and preparation; demographic trends; high school activities and experiences; educational and career plans; majors and careers; attitudes; student values; and means of financing education.

The CIRP National Norms Study sample is derived from students attending institutions that volunteered to participate in the study. Therefore, it is not a random sample of the U.S. population of higher education institutions and students. As a result, survey findings may not present trends in the Nation as a whole.

The Integrated Postsecondary Education Data System Survey: Fall Enrollment, Completions and Institutional Characteristics

Contact:
National Center for Education Statistics
U.S. Department of Education
555 New Jersey Avenue, NW
Washington, DC 20208-5652
Tel: (202) 219-1373
Fax: (202) 219-1679

The Integrated Postsecondary Education Data System (IPEDS) began in 1986 as a supplement to and replacement for the Higher Education General Information Survey (HEGIS), which began in 1966. HEGIS was an annual survey of institutions listed in the current NCES Education Directory of Colleges and Universities; IPEDS surveys all postsecondary institutions, including universities and colleges and the institutions that offer technical and vocational education. The higher education portion is a census of accredited 2- and 4-year colleges, whereas technical and vocational schools are surveyed on a sample basis.

IPEDS consists of several integrated components that obtain information on types of institutions where postsecondary education is available, student participants, programs offered and completed, and the human and financial resources involved in the delivery of postsecondary education. The components of IPEDS include surveys of institutional characteristics; fall enrollment of students, including their age and residence; fall enrollment in occupationally specific programs; completions; finance; staff; salaries of full-time instructional faculty; and academic libraries.

The IPEDS Institutional Characteristics survey provides the basis for the universe of institutions reported in the Education Directory of Colleges and Universities. The universe includes institutions that met certain accreditation criteria and offered at least a 1-year program of college-level studies leading toward a degree. Each fall, institutions listed in the previous year's directory are asked to update information on the characteristics of their schools.

The IPEDS Completions Survey replaces and extends the HEGIS Degrees and Other Formal Awards Conferred Survey. The Completions Survey is administered to a census of institutions offering degrees at the bachelor's level and above, all 2-year institutions, and a sample of less-than-2-year institutions.

The IPEDS Fall Enrollment Survey replaces and extends the previous HEGIS surveys of institutions of higher education.

Imputations were developed for institutions that provided incomplete racial/ethnic data. Some of these institutions had reported total degrees awarded but not racial/ethnic data. In these cases, NCES imputed data on the basis of an earlier response for each institution, if available. The percentage of imputed data for racial/ethnic categories in 1993 ranged from 0.6 percent to 1.7 percent for bachelor's degrees, and from 1.8 percent to 7.0 percent for master's degrees. Other institutions reported totals that were larger or smaller than the sum of the racial/ethnic components, or reported racial/ethnic data as unknown. In these cases, NCES distributed the difference among the racial/ethnic groups for that institution.

Survey of Earned Doctorates

Contact:
Division of Science Resources Studies
National Science Foundation
4201 Wilson Boulevard
Arlington, VA 22230
Tel: (703) 306-1774
Fax: (703) 306-0510

The Survey of Earned Doctorates (SED) has been conducted annually since 1957, under contract by the National Research Council of the National Academy of Sciences, for the National Science Foundation, the U.S. Department of Education, the National Endowment for the Humanities, the National Institutes of Health, and the U.S. Department of Agriculture. This is a census survey of all recipients of research doctoral degrees such as PhD or D.Sc.; it excludes the recipients of first-professional degrees such as J.D. or M.D. Therefore, SED data are restricted to research doctorates.

Data for the SED are collected directly from individual doctorate recipients. The recipients are asked to provide information on the field and specialty of their degree, as well as their personal educational history, selected demographic data, and information on their postgraduate work and study plans. Approximately 95 percent of the annual cohort of doctorate recipients respond to the questionnaire, which is distributed through the cooperation of the graduate deans at institutions awarding doctorates.

Partial data from public sources, such as field of study, are added to the file for nonrespondents. No imputations are made, however, for nonresponse for data not available elsewhere, such as race/ethnicity information. The data for a given year include all doctorates awarded in the 12-month period ending on June 30 of that year.

Survey of Graduate Students and Postdoctorates in Science and Engineering: 1993

Contact:
Division of Science Resources Studies
National Science Foundation
4201 Wilson Boulevard
Arlington, VA 22230
Tel: (703) 306-1774
Fax: (703) 306-0510

This annual survey collects data from all institutions offering graduate programs in any science, engineering, or health field. Data are collected at the academic department level. Available information includes full-time graduate students by source and mechanism of support, including data on women and first-year students enrolled full time; part-time graduate students by sex; and citizenship and racial/ethnic background of all graduate students. In addition, detailed data on postdoctorates are available by source of support, sex, and citizenship, including separate data on those holding first-professional doctorates in the health fields; summary information on other doctorate nonfaculty research personnel is also included.

In fall 1993, the latest survey cycle for which final data are available, the survey universe included approximately 11,150 departments at 605 institutions of higher education, including 346 doctorate- and 259 master's-granting institutions. Separate data were obtained from 120 specialized entities such as medical and dental schools, schools of public health, and other organizational units, bringing the total number of responding entities to 725. Coverage included all departments in 62 science, engineering, and health fields: 39 science fields (4 physical, 4 environmental, 1 mathematical, 1 computer, 1 agricultural, 17 biological, 1 psychology, and 10 social), 14 engineering fields, and 9 health fields.

The National Postsecondary Student Aid Study, "Undergraduate Financing of Postsecondary Education," 1992–93

Contact:
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The National Postsecondary Student Aid Study (NPSAS) was established by NCES to collect information concerning financial aid allocated to students enrolled in U.S. postsecondary institutions. After a national field test in 1985–1986, NPSAS was first administered in the fall of the 1986–1987 academic year. NCES conducted a second cycle of NPSAS for the 1989–1990 school year. This second cycle also contained enhancements to the methodology used in the 1987 cycle. The 1993 estimates, although generally comparable to the 1990 estimates, are not comparable to published estimates from the 1987 NPSAS.

The 1992–1993 in-school sample involved about 78,000 undergraduate and graduate students selected from registrar lists of enrollees at postsecondary institutions. The sample included students who did and did not receive financial aid. Student information such as field of study, educational level, and attendance status (part-time or full-time) was obtained from registrar records. Types and amounts of financial aid and family financial characteristics were abstracted from school financial aid records. Parents of students were also sampled to compile data concerning family composition and parental financial characteristics. Biennial follow-up data collections are expected. Students enrolled in postsecondary education for the first time in 1990 will serve as the base for the longitudinal component of NPSAS.

The SESTAT Data System

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In the 1990s, NSF redesigned its data system about scientists and engineers. Termed SESTAT, the new data system integrates data from the NSF demographic surveys (Survey of Doctorate Recipients, National Survey of College Graduates, National Survey of Recent College Graduates), the Occupational Employment Statistics (OES) Survey, and administrative data from the Immigration and Naturalization Service (INS). The integration of the SESTAT demographic surveys requires complementary sample populations and reference periods, matching survey questions and procedures, as well as weighting adjustments for any overlapping populations.

The demographic surveys provide data on educational background, occupation, employment, and demographic characteristics. These surveys are of individuals and have a combined sample size of about 140,000. The OES, a large-scale survey of establishments, has occupational estimates by detailed industry category. The INS information provides counts of persons who have received permanent visas and who listed science or engineering as their occupation. OES and INS counts also include estimates of science and engineering technicians and technologists.

Scholars and policy analysts may access the SESTAT system through a variety of means, including access through the World Wide Web and restricted use data files. Individuals interested in obtaining more information about accessing the system should contact the Division of Science Resources Studies' Science and Engineering Personnel Program (PER) listed above.

Survey of Doctorate Recipients: 1993

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The Survey of Doctorate Recipients (SDR) is a longitudinal survey designed to provide demographic and career history information about individuals with doctoral degrees. The survey is conducted for the National Science Foundation and other Federal agencies under contract by the National Research Council of the National Academy of Sciences. The 1993 survey, the 11th in a biennial series, reflects a number of improvements made by the National Science Foundation. The SDR is a survey of individuals under the age of 76 who hold doctorates in science and engineering from U.S. institutions. Several improvements introduced into the 1993 SDR affect comparability with SDR data published in prior survey years.

Among the variables included in this survey are citizenship, date of birth, disability status, educational history, employment status (unemployed, employed part time, or employed full time), field of degrees, geographic place of employment, labor force status, occupation, postdoctorate status, primary work activity (e.g., teaching, basic research), race/ethnicity, salary, sector of employment (academia, industry, government), sex, and years of professional experience.

The sample size for the 1993 survey was approximately 50,000 and had a response rate of 87 percent. The sample was stratified on the basis of field of degree, sex, disability status, racial/ethnic group, and nativity (i.e., whether born in the United States) to provide more reliable data on rare subgroups in the population. The sample frame used to identify these individuals is the Doctorate Records File, maintained by the National Academy of Sciences. The primary source of information for the frame is the Survey of Earned Doctorates (SED) (discussed separately above). For individuals who received a degree prior to 1957 when the SED started, information was taken from a register of highly qualified scientists and engineers that the National Academy of Sciences assembled from a variety of sources.

Because this is a longitudinal survey, recent recipients of research doctorates are added each time the survey is conducted and individuals no longer under age 76 are dropped. Initial data collection in 1993 was by mail. Nonrespondents to the mail questionnaire were followed up, using computer-assisted telephone interviewing techniques. The instrument used in the phone follow-up was modified from the mail instrument to avoid difficulties encountered in administering some of the questions by phone, especially those (such as field of degree and field of occupation) that require individuals to select from an extensive list of possible responses.

National Survey of College Graduates, 1993

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The 1993 National Survey of College Graduates (NSCG) is a National Science Foundation survey of 215,000 individuals under age 76 who had a bachelor's degree or higher at the time of the 1990 Decennial Census. It is the primary source of data at NSF on scientists and engineers with bachelor's and master's degrees. The NSCG collects information on fields and levels of education, occupation, work activities, earnings, demographic, and other information on the science and engineering workforce.

The NSCG also contains information on PhDs, albeit with a much smaller sample size than NSF's biennial Survey of Doctoral Recipients (SDR), which remains the primary source of data on PhD scientists and engineers. The NSCG mailed to 10,000 individuals who had reported PhDs on the 1990 census and also picked up information on many individuals reporting bachelor's or master's degrees in 1990 who had completed the PhD by April 1993. An advantage of a sample drawn from the U.S. Census Bureau is that the NSCG includes data on PhDs and other degrees received from foreign institutions. Microdata on this part of the science and engineering population is not available from any other source. This survey is designed to be a baseline survey for the decade of the 1990s. Current plans are to follow individuals identified in this survey as having a science and engineering degree and/or a science or engineering occupation biennially between 1995 and 2001.

The definition of the population surveyed has changed several times over time. For example, the baseline survey in 1982 selected individuals with 4 or more years of college and did not screen for age. The changes between 1993 and prior surveys in population definition and other aspects of the survey are sufficiently great that NSF does not believe that meaningful trend analyses can be performed, comparing the 1993 data with the 1980s data.

National Survey of Recent College Graduates, 1993

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The National Survey of Recent College Graduates (NSRCG) provides information about individuals who recently obtained bachelor's or master's degrees in a science or engineering field. Key variables include demographic information, employment status, field of degree, school enrollment status, occupation, sector of employment, primary work activity, salary, and years of professional experience.

The population of the 1993 survey consisted of all individuals under the age of 76 who received bachelor's or master's degrees in science or engineering between April 1, 1990, and June 30, 1992, from a U.S. institution. This survey is designed in part to cover individuals excluded from the National Survey of College Graduates, because they did not have a college degree as of April 1, 1990. Current plans are to follow a sample of individuals identified in this survey biennially between 1995 and 2001, along with individuals identified as being of interest in the NSCG.

The NSRCG sample is a two-stage sample. The first stage consists of selecting U.S. institutions that grant bachelor's or master's degrees in science and/or engineering fields. The sample frame of schools for inclusion in the first stage of the sample is obtained from the Integrated Postsecondary Education Data System database maintained by the National Center for Education Statistics. In 1993, 274 institutions were selected in the first-stage sample. The sample frame for the selection of graduates is obtained from representatives of the institutions selected at the first stage. In total, 26,000 individuals were selected in 1993. The current estimated response rate for the first stage of this survey in 1993 is approximately 99 percent and for the second stage is approximately 86 percent.

A number of changes have been made in the definition of the population surveyed over time. For example, the 1990 survey included individuals receiving bachelor's degrees in fields such as engineering technology; these are excluded from the 1993 survey. The changes between 1993 and prior surveys in population definition and other aspects of the survey are sufficiently great that Science Resources Studies staff believe that trend analyses must be performed very cautiously, if at all.

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APPENDIX B

STATISTICAL TABLES

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Appendix table 1-1. Federal definitions of special education disability categories

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Specific learning disability. A disorder in one or more of the basic psychological processes involved in understanding or using language, spoken or written, which may manifest itself in an imperfect ability to listen, think, speak, write, spell, or do mathematical calculations; this includes perceptual handicaps, brain injury, minimal brain disfunction, dyslexia, and developmental aphasia, but does not include learning problems resulting from visual, hearing, or motor handicaps, or from mental retardation.

Seriously emotionally disturbed. Exhibition of behavior disorders over a long period of time that adversely affect educational performance; this includes an inability to learn that cannot be explained by intellectual, sensory, or health factors; an inability to build or maintain satisfactory interpersonal relationships with peers and teachers; inappropriate types of behaviors or feelings under normal circumstances; a general pervasive mood of unhappiness or depression; or a tendency to develop physical symptoms or fears associated with personal or school problems.

Speech impaired. Communication disorders, such as stuttering, impaired articulation, and language or voice impairments, that adversely affect educational performance.

Mentally retarded. Significantly subaverage general intellectual functioning with concurrent deficits in adaptive behavior that were manifested in the development period and that adversely affect educational performance.

Visually impaired. A visual impairment that, even with correction, adversely affects educational performance, including students who are partially sighted or completely blinded.

Hard of hearing. A hearing impairment, permanent or fluctuating, that adversely affects educational performance but that is not included in the deaf category.

Deaf. A hearing impairment that is so severe that the child is impaired in processing linguistic information through hearing, with or without amplification, which adversely affects educational performance.

Orthopedically impaired. A severe orthopedic impairment that adversely affects educational performance, including those caused by congenital anomaly, disease, or other causes.

Other health impaired. Limited strength, vitality, or alertness due to chronic or acute health problems that adversely affect educational performance (includes autistic students).

Multiply handicapped. Concomitant impairments, the combination of which causes such severe educational problems that they cannot be accommodated in special education programs solely for one of the impairments (does not include deaf/blind).

Deaf/blind. Concomitant hearing and visual impairments, the combination of which causes such severe communication and other developmental and educational problems that they cannot be accommodated in special education programs solely for deaf or blind students.

SOURCE: SRI International. 1991. *Youth With Disabilities: How Are They Doing? The First Comprehensive Report from the National Longitudinal Transition Study of Special Educational Students.* Washington, DC: SRI International.

Appendix table 1-2. Resident population of the United States, by race/ethnicity and sex: July 1993

[Numbers in thousands]

Page 1 of 1

Race/ethnicity and sex	Number	Percent
All races/ethnicities	257,908	100.0
Men	125,898	48.8
Women	132,010	51.2
White, non-Hispanic	191,830	74.4
Men	93,623	36.3
Women	98,208	38.1
Black, non-Hispanic	30,759	11.9
Men	14,542	5.6
Women	16,217	6.3
Hispanic	25,164	9.8
Men	12,785	5.0
Women	12,379	4.8
American Indian	1,883	0.7
Men	926	0.3
Women	957	0.4
Asian	8,272	3.2
Men	4,022	1.6
Women	4,250	1.6

NOTE: Because of rounding, details may not add to totals.

SOURCE: U.S. Bureau of the Census, PPL-8. U.S. Population Estimates, by Age, Sex, Race, and Hispanic Origin, 1990 to 1993.

Appendix table 1-3. High school graduates age 18–24, by race, sex, and Hispanic origin: 1993

[Numbers in thousands]

Page 1 of 1

Race/ethnicity and sex	Number	Percent
All races/ethnicities	19,772	100.0
Men	9,541	48.3
Women	10,232	51.7
White	16,196	81.9
Men	7,857	39.7
Women	8,339	42.2
Black	2,629	13.3
Men	1,207	6.1
Women	1,425	7.2
Hispanic	1,682	8.5
Men	786	4.0
Women	895	4.5

NOTES: Because of rounding, details may not add to totals. Hispanics may be of any race.

SOURCE: Bruno, Rosalind R., and Adams, Andrea. 1994. *School Enrollment—Social and Economic Characteristics of Students: October 1993.* Current Population Reports P20-479, October 1994. Washington, DC: Bureau of the Census.

Appendix table 1-4. Civilian labor force age 20 and older, by race, sex, and Hispanic origin: 1993

[Numbers in thousands]

Page 1 of 1

Race/ethnicity and sex	Number	Percent
All races	121,215	100.0
Men	66,069	54.5
Women	55,146	45.5
White	103,528	85.4
Men	57,115	47.1
Women	46,413	38.3
Black	13,166	10.9
Men	6,498	5.4
Women	6,668	5.5
Hispanic	9,717	8.0
Men	5,871	4.8
Women	3,846	3.2

NOTES: Because of rounding, details may not add to totals. Hispanics may be of any race.

SOURCE: U.S. Department of Labor, Bureau of Labor Statistics. Employment and Earnings. January 1995.

Appendix table 1-5. 1992 bachelor's science and engineering graduates, by race/ethnicity and sex: 1993

Page 1 of 1

Race/ethnicity	Total		Men		Women	
	Number	Percent	Number	Percent	Number	Percent
All races/ethnicities	250,400	100.0	141,900	100.0	108,600	100.0
White, non-Hispanic	204,100	81.5	118,900	83.8	85,200	78.5
Asian	17,100	6.8	10,200	7.2	7,000	6.4
Black, non-Hispanic	18,800	7.5	6,900	4.9	11,800	10.9
Hispanic	9,600	3.8	5,500	3.9	4,100	3.8
American Indian	900	0.4	400	0.3	500	0.5

NOTE: Because of rounding, details may not add to totals.

SOURCE: National Science Foundation/SRS, National Survey of Recent College Graduates, 1993.

Women, Minorities, and Persons With Disabilities in Science and Engineering: 1996

Appendix table 1-6. Scientists and engineers in the labor force, by race/ethnicity and sex: 1993

Page 1 of 1

Race/ethnicity	Total	Men	Women
All races/ethnicities	3,227,000	2,504,000	722,000
White, non-Hispanic	2,730,000	2,136,000	594,000
Asian	288,000	222,000	67,000
Black, non-Hispanic	112,000	73,000	38,000
Hispanic	91,000	69,000	22,000
American Indian	6,000	5,000	2,000

NOTE: Because of rounding, details may not add to totals.

SOURCE: National Science Foundation/SRS, National Survey of College Graduates, 1993.

Appendix table 2-1. Percentage of high school graduates who have taken selected mathematics courses, by sex and race/ethnicity: 1982 and 1992

Page 1 of 1

Year and course	Total	Male	Female	White	Black	Hispanic	Asian	American Indian
1982:								
Any mathematics	99.0	99.4	98.7	99.1	99.6	98.6	100.0	96.6
Remedial/below grade level mathematics	32.5	35.9	29.5	27.0	54.4	48.5	18.8	52.6
Algebra I	68.4	66.4	70.4	71.1	61.1	59.9	67.4	54.1
Algebra II	36.9	37.5	36.3	40.5	26.2	22.5	55.0	20.0
Geometry	48.4	48.3	48.5	53.9	30.3	29.0	64.3	26.3
Trigonometry	12.2	13.3	11.2	13.8	6.3	6.8	25.7	7.7
Analysis/precalculus	5.8	6.1	5.5	6.7	2.1	3.0	15.1	0.7
Calculus	4.3	4.7	4.0	5.0	1.4	1.6	13.1	1.2
Advanced placement calculus	1.4	1.4	1.4	1.7	0.3	0.3	5.9	0.0
Algebra II and geometry	29.1	30.1	28.2	33.0	17.0	14.4	40.3	13.6
Albegra II, geometry, and trigonometry	7.4	8.5	6.3	8.5	2.9	4.2	12.9	3.1
Algebra II, geometry, trigonometry, and calculus	0.8	1.1	0.5	0.9	0.2	0.5	2.0	0.0
1992:								
Any mathematics	99.6	99.3	99.9	99.7	99.1	99.8	100.0	100.0
Remedial/below grade level mathematics	17.4	19.5	15.4	14.6	30.9	24.2	14.5	35.2
Algebra I	79.4	80.0	78.9	79.6	78.0	84.4	71.9	80.8
Algebra II	56.1	54.0	58.1	59.2	40.9	46.9	60.8	42.1
Geometry	70.4	69.0	71.7	72.6	60.4	62.9	77.1	53.6
Trigonometry	21.1	21.4	20.8	22.5	13.0	15.2	31.3	10.0
Analysis/precalculus	17.2	16.8	17.6	17.9	12.6	10.6	33.9	3.0
Calculus	10.1	10.3	9.8	10.7	6.9	4.7	20.1	1.4
Advanced placement calculus	5.5	5.7	5.4	5.8	2.5	2.2	16.1	1.3
Algebra II and geometry	50.1	48.6	51.6	53.1	35.0	41.9	55.5	35.7
Albegra II, geometry, and trigonometry	14.5	14.7	14.4	15.9	6.8	10.9	18.2	5.9
Algebra II, geometry, trigonometry, and calculus	2.7	2.6	2.8	3.0	0.9	1.2	5.4	0.6

NOTES: Percentages reflect only those courses taken in high school. Because some students take algebra I and other similar courses in the eighth grade, these percentages could underestimate the number of individuals who have ever taken algebra I and other subjects in school. Because of the use of a different editing procedure, the statistics shown for 1982 differ slightly from previously published figures.

SOURCE: U.S. Department of Education/NCES. 1994. *The Condition of Education, 1994.* Washington, DC: U.S. Department of Education.

Appendix table 2-2. Percentage of high school graduates who have taken selected science courses, by sex and race/ethnicity: 1982 and 1992

Page 1 of 1

Year and course	Total	Male	Female	White	Black	Hispanic	Asian	American Indian
1982:								
Any science	97.6	97.5	97.7	97.7	98.6	95.9	97.1	98.4
Biology	78.7	76.5	80.6	80.1	75.3	73.2	83.5	65.5
AP/honors biology	6.7	6.2	7.2	7.5	4.5	3.5	13.1	5.1
Chemistry	31.6	32.4	30.9	34.7	22.5	16.7	51.9	34.1
AP/honors chemistry	2.6	3.1	2.1	2.9	1.6	1.3	5.8	0.9
Physics	13.5	17.9	9.4	15.3	6.8	5.5	35.8	6.9
AP/honors physics	0.9	1.2	0.5	0.9	0.8	0.4	3.5	0.0
Engineering	0.1	0.2	0.1	0.2	0.2	0.1	0.0	0.0
Astronomy	0.2	0.3	0.1	0.2	0.2	0.3	0.0	0.0
Geology	11.4	12.7	10.2	12.0	8.7	9.6	7.9	9.1
Biology and chemistry	28.6	28.4	28.9	31.6	20.2	15.2	47.2	19.1
Biology, chemistry, and physics	9.8	12.5	7.4	11.2	4.7	3.7	28.6	4.7
1992:								
Any science	99.6	99.5	99.7	99.5	100.0	99.7	100.0	100.0
Biology	93.0	91.9	94.2	93.5	92.2	91.2	93.4	84.5
AP/honors biology	5.7	5.8	5.7	6.5	3.2	2.4	6.8	5.0
Chemistry	55.5	54.2	56.8	58.0	45.9	42.6	67.4	32.9
AP/honors chemistry	4.0	4.3	3.7	4.2	2.3	2.5	9.1	1.8
Physics	24.7	28.2	21.4	25.9	17.6	15.7	41.6	13.3
AP/honors physics	2.9	4.0	1.9	2.9	1.4	2.4	9.2	0.6
Engineering	0.3	0.4	0.3	0.3	0.2	0.1	0.5	0.0
Astronomy	0.7	0.9	0.6	1.0	0.1	0.1	0.1	0.0
Geology	18.4	18.8	18.0	19.3	17.6	11.5	16.6	29.7
Biology and chemistry	53.9	52.2	55.6	56.5	44.2	40.5	65.4	31.2
Biology, chemistry, and physics	21.6	24.4	18.9	22.6	15.5	12.8	39.2	10.8

NOTES: Percentages reflect only those courses taken in high school. Because some students take algebra I and other similar courses in the eighth grade, these percentages could underestimate the number of individuals who have ever taken algebra I and other subjects in school. Because of the use of a different editing procedure, the statistics shown for 1982 differ slightly from previously published figures.

SOURCE: U.S. Department of Education/NCES. 1994. *The Condition of Education, 1994.* Washington, DC: U.S. Department of Education.

Appendix table 2-3. Average scores by percentile for the National Assessment of Educational Progress mathematics test for age 9, by sex and race/ethnicity: 1978–1992, selected years

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Percentile, sex, and race/ethnicity	1978	1982	1986	1990	1992
Total students:					
5th	157.1	159.3	163.0	173.3	172.2
10th	171.1	173.2	176.7	185.8	185.4
25th	194.6	196.0	199.0	207.8	207.9
50th	220.1	220.4	223.3	231.1	231.0
75th	243.7	243.3	245.6	252.5	252.6
90th	264.0	262.7	264.2	271.0	270.9
95th	275.7	273.8	275.5	282.1	281.7
Male:					
5th	154.9	156.4	162.7	171.8	172.7
10th	169.0	170.2	176.1	184.6	186.1
25th	192.8	193.0	198.6	206.7	208.9
50th	218.4	218.6	223.0	230.4	232.2
75th	243.0	242.3	245.7	252.4	254.2
90th	263.8	262.2	265.1	271.6	272.5
95th	275.2	273.6	276.4	282.8	283.8
Female:					
5th	159.4	162.8	163.5	174.5	171.8
10th	173.1	176.6	177.5	187.0	184.9
25th	196.4	198.9	199.0	208.9	206.9
50th	221.5	222.2	223.5	231.8	229.9
75th	244.3	244.2	245.5	252.7	251.1
90th	264.2	263.1	263.3	270.4	269.2
95th	276.1	273.9	274.2	281.4	279.8
White:					
5th	166.3	168.1	170.6	181.8	181.8
10th	179.4	180.8	183.9	194.0	194.2
25th	201.4	201.9	205.3	214.6	215.0
50th	225.1	225.3	228.3	236.3	236.1
75th	247.7	246.8	249.6	256.4	256.4
90th	267.0	265.3	267.4	274.5	273.9
95th	278.4	276.0	278.2	284.8	284.5
Black:					
5th	133.7	136.7	146.2	156.0	154.9
10th	147.0	150.4	158.4	167.1	165.9
25th	169.3	172.5	180.5	186.0	185.5
50th	193.0	196.6	202.9	208.4	208.6
75th	216.4	218.2	223.6	231.4	230.4
90th	236.1	235.7	241.2	248.9	249.2
95th	247.5	247.9	251.3	258.9	258.7
Hispanic:					
5th	144.4	148.1	154.8	161.8	158.6
10th	156.3	160.8	163.8	173.4	169.0
25th	178.7	181.3	184.5	193.1	189.7
50th	204.3	205.2	206.3	216.2	211.8
75th	227.2	226.5	226.0	235.1	233.8
90th	249.5	246.4	244.8	251.7	252.7
95th	259.6	256.6	254.4	262.2	263.1

NOTE: Standard errors are included in source publication.

SOURCE: Educational Testing Service. 1994. *Trends in Academic Progress.*
Washington, DC: U.S. Department of Education.

Appendix table 2-4. Average scores by percentile for the National Assessment of Educational Progress mathematics test for age 13, by sex and race/ethnicity: 1978–1992, selected years

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Percentile, sex, and race/ethnicity	1978	1982	1986	1990	1992
Total students:					
5th	198.2	212.4	218.3	217.6	220.5
10th	213.3	225.3	230.0	230.2	233.2
25th	238.1	246.2	248.3	249.8	252.9
50th	265.2	269.5	268.7	270.9	274.1
75th	291.1	291.6	289.6	291.7	294.0
90th	313.4	310.8	309.2	309.9	311.9
95th	326.6	322.2	320.5	320.1	322.9
Male:					
5th	195.8	211.5	218.0	215.5	220.5
10th	211.4	224.3	229.5	228.6	233.2
25th	236.7	246.1	248.9	250.2	253.1
50th	264.8	270.2	270.0	272.0	274.9
75th	291.5	293.3	291.4	293.1	295.7
90th	314.4	312.5	310.8	312.4	314.0
95th	327.5	324.1	322.0	323.1	324.8
Female:					
5th	200.9	213.5	218.5	220.4	220.6
10th	215.0	226.2	230.6	231.4	233.0
25th	239.4	246.3	247.8	249.5	252.7
50th	265.7	268.8	267.4	269.9	273.4
75th	290.7	290.1	287.8	290.3	292.2
90th	312.4	308.8	307.2	307.7	309.8
95th	325.6	320.1	318.5	317.3	320.8
White:					
5th	211.9	223.0	225.7	228.2	230.9
10th	225.5	234.4	236.5	239.3	242.2
25th	247.6	253.5	254.1	257.3	260.5
50th	272.2	274.9	273.3	276.6	279.4
75th	296.0	295.5	293.2	296.0	298.0
90th	317.1	313.8	312.1	313.2	315.1
95th	329.6	324.8	322.9	322.9	325.2
Black:					
5th	170.2	201.7	201.7	201.6	199.5
10th	184.1	200.2	213.2	211.8	212.3
25th	205.5	219.3	230.7	229.9	231.1
50th	229.0	241.0	249.3	249.4	250.6
75th	254.1	260.9	266.9	267.8	270.9
90th	276.4	279.7	284.4	285.3	286.5
95th	288.4	291.1	296.4	296.2	297.4
Hispanic:					
5th	180.2	202.3	205.9	206.2	212.2
10th	192.5	213.5	216.2	216.4	224.0
25th	214.3	230.7	235.5	234.3	240.6
50th	237.4	251.9	254.3	255.1	259.4
75th	261.9	273.7	274.2	275.2	278.6
90th	283.7	292.8	291.7	292.2	294.9
95th	296.3	304.1	301.2	303.3	304.1

NOTE: Standard errors are included in source publication.

SOURCE: Educational Testing Service. 1994. *Trends in Academic Progress.*
Washington, DC: U.S. Department of Education.

Appendix table 2-5. Average scores by percentile for the National Assessment of Educational Progress mathematics test for age 17, by sex and race/ethnicity: 1978–1992, selected years

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Percentile, sex, and race/ethnicity	1978	1982	1986	1990	1992
Total students:					
5th	241.3	244.9	251.7	253.4	255.6
10th	254.2	255.9	262.7	264.0	267.2
25th	276.4	275.8	280.7	282.5	286.3
50th	301.4	298.8	301.4	304.9	307.6
75th	325.4	321.5	323.1	326.5	328.0
90th	344.7	340.6	343.0	344.5	345.2
95th	355.7	351.2	354.0	355.5	354.8
Male:					
5th	243.8	247.0	252.7	252.8	257.8
10th	257.0	257.9	264.1	263.9	268.9
25th	278.9	278.1	282.3	283.7	287.8
50th	304.8	301.8	303.9	306.4	309.0
75th	329.5	325.1	327.8	329.3	331.4
90th	349.2	344.4	346.7	347.8	348.6
95th	360.1	354.4	357.5	358.5	358.1
Female:					
5th	239.3	242.8	250.3	253.9	253.7
10th	252.2	254.1	261.2	264.0	265.6
25th	274.3	273.7	279.3	281.5	284.8
50th	298.3	296.1	296.1	303.7	305.8
75th	321.5	317.7	319.8	324.1	324.8
90th	340.3	336.7	338.2	341.4	341.4
95th	350.4	347.2	349.3	351.8	350.6
White:					
5th	251.9	253.3	261.2	260.2	264.1
10th	263.3	263.8	270.5	270.5	274.4
25th	283.5	282.3	286.9	288.8	292.8
50th	306.6	303.9	306.8	310.1	312.8
75th	328.9	325.1	327.8	330.1	332.2
90th	347.3	343.4	346.1	347.2	348.0
95th	357.8	353.4	356.0	357.1	357.4
Black:					
5th	217.2	225.1	236.7	245.4	238.5
10th	227.8	234.5	244.3	253.5	248.9
25th	245.7	251.4	259.9	268.7	267.4
50th	267.7	271.2	278.6	287.1	286.9
75th	290.5	291.2	296.1	307.1	303.9
90th	310.3	310.8	312.0	325.7	320.8
95th	320.7	321.3	324.8	337.7	330.8
Hispanic:					
5th	224.1	232.0	236.3	229.1	247.5
10th	234.0	240.7	248.5	242.2	257.8
25th	253.4	255.8	264.7	263.8	273.3
50th	275.1	275.3	283.1	281.8	291.6
75th	298.5	297.1	301.2	304.0	310.7
90th	319.5	314.9	318.6	325.1	327.7
95th	332.0	326.7	329.3	336.3	336.4

NOTE: Standard errors are included in source publication.

SOURCE: Educational Testing Service. 1994. *Trends in Academic Progress.* Washington, DC: U.S. Department of Education.

Appendix table 2-6. Average mathematics proficiency: percent of students at or above selected anchor points, by age, race/ethnicity, and sex: 1982–1992, selected years

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Age and year	Anchor point	Total	White	Black	Hispanic	Male	Female
Age 9	200						
1982		71.4	76.8	46.1	55.7	68.8	74.0
1986		74.1	79.6	53.4	57.6	74.0	74.3
1990		81.5	86.9	60.0	68.4	80.6	82.3
1992		81.4	86.9	59.8	65.0	81.9	80.9
Difference 1982–1992		10.0	10.1	13.7	9.3	13.1	6.9
Age 13	250						
1982		71.4	78.3	37.9	52.2	71.3	71.4
1986		73.3	78.9	49.0	56.0	73.8	72.7
1990		74.7	82.0	48.7	56.7	75.1	74.4
1992		77.9	84.9	51.0	63.3	78.1	77.7
Difference 1982–1992		6.5	6.6	13.1	11.1	6.8	6.3
Age 17	300						
1982		48.5	54.7	17.1	21.6	51.9	45.3
1986		51.7	59.1	20.8	26.5	54.6	48.9
1990		56.1	63.2	32.8	30.1	57.6	54.7
1992		59.1	66.4	29.8	39.2	60.5	57.7
Difference 1982–1992		10.6	11.7	12.7	17.6	8.6	12.4

NOTE: Standard errors are included in source publication.

SOURCE: Educational Testing Service. 1994. *Trends in Academic Progress.* Washington, DC: U.S. Department of Education.

Appendix table 2-7. Average mathematics achievement scores, by sex, race/ethnicity, and grade: 1992

Page 1 of 1

Sex and race/ethnicity	Grade 4	Grade 8	Grade 12
Total	218.5	267.7	298.7
Male	219.7	267.4	300.6
Female	217.3	268.0	297.0
White	226.8	277.2	305.0
Black	191.5	236.8	274.8
Hispanic	200.8	246.3	282.9
Asian	231.3	288.0	315.3
American Indian	209.1	254.3	281.1

NOTE: Standard errors are included in source publication.

SOURCE: Educational Testing Service. 1994. *Trends in Academic Progress.* Washington, DC: U.S. Department of Education.

Appendix table 2-8. Average scores by percentile for the National Assessment of Educational Progress science test for age 9, by sex and race/ethnicity: 1977–1992, selected years

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Percentile, sex, and race/ethnicity	1977	1982	1986	1990	1992
Total students:					
5th	143.8	150.9	155.0	159.8	162.8
10th	160.9	166.8	169.9	176.1	177.8
25th	190.1	194.4	195.4	202.0	203.8
50th	221.5	221.4	225.1	230.3	232.1
75th	251.0	249.0	253.1	256.6	258.4
90th	276.5	272.4	276.9	278.8	280.6
95th	291.4	286.4	290.9	292.1	293.6
Male:					
5th	146.8	150.4	158.0	159.6	164.7
10th	163.2	166.5	172.9	176.3	180.9
25th	191.9	193.5	198.7	202.1	207.2
50th	223.6	221.3	227.9	231.6	236.2
75th	253.4	250.4	256.1	259.4	263.1
90th	279.1	274.7	280.3	283.3	285.8
95th	294.2	287.1	294.8	296.3	298.6
Female:					
5th	141.3	151.2	152.5	159.9	161.0
10th	158.5	167.5	166.9	175.8	175.3
25th	188.3	195.3	193.2	201.9	200.9
50th	219.5	221.4	222.5	229.2	228.5
75th	248.6	247.4	250.2	254.0	253.7
90th	273.8	270.6	273.3	274.6	275.0
95th	288.2	284.4	287.0	287.0	287.7
White:					
5th	163.2	167.0	166.5	176.9	178.0
10th	177.6	182.2	181.0	189.9	191.0
25th	202.4	203.8	205.5	212.6	214.5
50th	229.8	228.6	232.5	238.3	240.0
75th	256.9	254.9	258.8	262.3	264.2
90th	281.1	277.6	281.7	283.5	285.1
95th	295.4	290.8	294.9	295.7	297.5
Black:					
5th	107.0	123.6	132.8	131.3	138.0
10th	122.8	136.7	146.9	145.3	151.6
25th	146.6	159.2	169.7	169.8	173.7
50th	173.8	188.2	195.9	196.3	201.1
75th	202.9	214.4	222.6	224.1	226.3
90th	229.2	236.4	246.4	246.8	248.4
95th	244.1	246.5	259.5	260.0	260.5
Hispanic:					
5th	125.2	127.3	134.0	146.2	143.0
10th	139.8	141.9	148.1	158.5	156.8
25th	163.9	161.9	172.6	180.6	179.1
50th	191.4	190.8	199.8	206.2	204.8
75th	219.0	215.9	225.6	232.7	230.4
90th	245.7	236.2	252.1	252.9	253.7
95th	261.3	246.0	264.9	266.8	264.9

NOTE: Standard errors are included in source publication.

SOURCE: Educational Testing Service. 1994. *Trends in Academic Progress.* Washington, DC: U.S. Department of Education.

Appendix table 2-9. Average scores by percentile for the National Assessment of Educational Progress science test for age 13, by sex and race/ethnicity: 1977–1992, selected years

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Percentile, sex, and race/ethnicity	1977	1982	1986	1990	1992
Total students:					
5th	173.7	185.2	188.9	191.4	193.1
10th	190.6	199.6	203.3	205.9	208.9
25th	218.4	224.1	227.2	230.0	234.7
50th	248.6	250.9	252.1	256.4	260.4
75th	277.5	276.7	276.5	281.1	283.8
90th	302.4	299.2	298.2	302.4	303.1
95th	316.0	312.8	310.3	315.1	314.6
Male:					
5th	176.7	190.2	192.3	191.9	193.4
10th	193.5	204.4	207.2	207.3	209.4
25th	221.5	229.5	231.1	232.9	235.8
50th	252.4	256.7	256.9	260.3	262.7
75th	281.6	282.6	282.4	285.8	287.0
90th	306.5	305.0	303.4	307.4	306.4
95th	321.2	318.3	316.2	320.2	318.1
Female:					
5th	170.8	180.2	186.3	190.6	192.7
10th	187.7	195.5	200.5	204.8	208.4
25th	215.5	219.7	223.4	227.8	233.4
50th	245.0	246.1	248.0	253.1	258.2
75th	273.0	271.0	271.0	276.8	280.7
90th	297.7	292.8	291.3	296.8	299.8
95th	312.1	305.3	304.0	308.6	311.1
White:					
5th	190.8	198.0	203.5	208.6	212.6
10th	205.2	210.8	215.8	220.4	225.7
25th	229.3	233.2	237.0	241.3	246.1
50th	256.3	257.6	259.2	264.5	267.8
75th	282.9	281.5	282.3	287.0	289.0
90th	306.6	302.7	302.2	307.1	307.1
95th	320.8	316.2	313.9	319.4	318.0
Black:					
5th	144.3	160.3	167.8	169.7	162.1
10th	157.7	173.0	180.1	181.8	177.0
25th	180.5	193.7	198.3	202.3	198.9
50th	207.4	216.8	221.2	225.7	223.8
75th	234.8	240.7	243.5	249.1	251.4
90th	259.5	262.2	264.4	269.0	272.0
95th	274.6	274.7	276.8	283.2	286.0
Hispanic:					
5th	147.1	166.3	171.1	173.7	180.3
10th	161.4	179.4	181.3	185.3	193.0
25th	185.8	200.7	201.6	205.9	215.2
50th	213.3	225.9	225.6	230.9	237.9
75th	240.3	249.3	249.8	256.4	260.9
90th	265.8	271.2	269.9	280.0	281.8
95th	282.1	284.8	283.0	294.2	292.1

NOTE: Standard errors are included in source publication.

SOURCE: Educational Testing Service. 1994. *Trends in Academic Progress.* Washington, DC: U.S. Department of Education.

Appendix table 2-10. Average scores by percentile for the National Assessment of Educational Progress science test for age 17, by sex and race/ethnicity: 1977–1992, selected years

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Percentile, sex, and race/ethnicity	1977	1982	1986	1990	1992
Total students:					
5th	212.6	203.2	211.8	209.9	217.7
10th	231.3	221.5	229.5	228.8	234.2
25th	260.6	252.5	259.6	260.3	263.6
50th	290.8	285.4	290.1	292.2	295.9
75th	320.1	315.3	319.4	322.7	326.6
90th	346.2	341.5	344.5	348.3	350.3
95th	361.5	357.3	359.9	362.9	363.8
Male:					
5th	219.5	210.3	213.9	210.4	219.0
10th	238.2	228.9	231.4	229.5	235.5
25th	267.6	261.1	263.5	263.4	267.4
50th	298.5	294.3	298.7	297.9	301.3
75th	328.1	324.8	327.6	329.9	333.6
90th	353.9	350.5	353.4	356.7	357.2
95th	368.8	365.3	367.0	372.5	370.4
Female:					
5th	207.5	198.3	209.8	209.2	216.5
10th	226.1	215.5	228.1	228.2	232.9
25th	254.5	245.7	256.2	257.7	260.3
50th	283.8	277.6	283.7	287.7	290.9
75th	311.5	306.2	310.8	316.2	319.8
90th	336.3	330.1	333.5	339.6	341.4
95th	351.2	345.2	348.3	351.5	354.4
White:					
5th	231.1	223.0	228.3	232.8	234.3
10th	246.0	239.1	244.5	249.0	251.3
25th	270.3	265.5	271.0	273.4	276.8
50th	297.5	293.6	298.7	301.2	306.0
75th	325.0	321.2	324.9	329.0	333.0
90th	349.9	246.0	348.9	352.3	355.1
95th	364.6	360.8	363.5	367.3	368.5
Black:					
5th	172.4	166.0	189.3	182.0	191.8
10th	187.3	180.6	201.6	196.6	206.6
25th	212.1	206.4	225.0	220.5	230.1
50th	240.4	234.7	251.9	251.6	255.4
75th	267.9	262.7	279.5	282.9	282.4
90th	293.4	288.8	306.0	313.5	308.2
95th	309.5	305.4	322.8	329.3	324.8
Hispanic:					
5th	193.7	178.0	194.4	188.7	196.6
10th	208.4	194.2	209.2	203.9	215.4
25th	234.3	218.8	232.0	230.6	241.6
50th	262.4	248.0	258.9	260.5	272.7
75th	289.5	278.4	285.8	292.6	297.9
90th	316.9	302.1	309.9	317.4	322.8
95th	331.3	320.8	324.4	329.5	339.1

NOTE: Standard errors are included in source publication.

SOURCE: Educational Testing Service. 1994. *Trends in Academic Progress.* Washington, DC: U.S. Department of Education.

Appendix table 2-11. Average science proficiency: percent of students at or above selected anchor points, by age, race/ethnicity, and sex: 1982–1992, selected years

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Age and year	Anchor point	Total	White	Black	Hispanic	Male	Female
Age 9	200						
1982		70.7	78.4	38.9	40.2	69.7	71.8
1986		72.0	78.9	46.2	50.1	74.1	70.0
1990		76.4	84.4	46.4	56.3	76.3	76.4
1992		78.0	85.5	51.3	55.5	80.4	75.7
Difference 1982–1992		7.3	7.1	12.4	15.3	10.7	3.9
Age 13	250						
1982		50.9	58.3	17.1	24.1	56.2	46.0
1986		52.5	61.0	19.6	24.9	57.3	47.7
1990		56.5	66.5	24.3	30.0	59.8	53.3
1992		61.3	71.1	26.2	36.5	62.9	59.6
Difference 1982–1992		10.4	12.8	9.1	12.4	6.7	13.6
Age 17	300						
1982		37.3	43.9	6.5	11.1	45.2	29.9
1986		41.3	48.7	12.5	14.8	48.8	34.1
1990		43.3	51.2	15.7	21.1	48.2	38.7
1992		46.6	55.4	14.1	23.0	50.9	42.0
Difference 1982–1992		9.3	11.5	7.6	11.9	5.7	12.1

NOTE: Standard errors are included in source publication.

SOURCE: Educational Testing Service. 1994. *Trends in Academic Progress*. Washington, DC: U.S. Department of Education.

Appendix table 2-12. Dropout and retention rates of 16- to 24-year-olds, by family income and disability status: 1992

[Percent distribution]

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Student characteristic	Retained in one or more grades	Dropout rate[1]		
		Total	Never retained	Retained
Total	11.5	11.0	9.4	19.8
Family income[2]:				
Low	16.5	24.6	22.6	33.2
Middle	11.3	10.1	8.6	16.6
High	7.8	2.3	1.5	8.5
Disability status:				
No disability	9.5	10.6	9.1	19.4
Disability	32.0	15.7	13.3	21.0
Learning disability only	51.8	15.6	15.0	16.8
Learning plus other disability	29.0	22.2	20.2	26.9
Other disability only	24.3	13.1	10.1	22.1

[1] The percentage who are not enrolled in school and who have not received a high school diploma or equivalency credential.

[2] Low income is the bottom 20 percent of all family incomes; high income is the top 20 percent of all family incomes; and middle income is the 60 percent in-between range.

SOURCE: U.S. Department of Commerce, Bureau of the Census, Current Population Survey, October 1992.

Appendix table 2-13. Selected characteristics of families, by race: 1993

[Numbers in thousands]

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Characteristic	Black	White	White, non-Hispanic
Children younger than 18 years of age by presence of parents[1] :			
Number of children younger than 18 years of age	10,660	53,075	45,768
Percent with both parents	35.6	77.2	79.2
Percent with mother only	54.0	17.4	15.8
Percent with father only	3.0	3.5	3.5
Percent with neither parent	7.3	1.8	1.5
Families below poverty level:			
All families	7,993	57,881	52,470
Number below poverty level	2,499	5,452	3,988
Percent below poverty level	31.3	9.4	7.6
Families with related children younger than 18 years of age	5,525	29,234	25,477
Number below poverty level	2,171	4,226	2,946
Percent below poverty level	39.3	14.5	11.6

[1] Excludes persons younger than 18 years of age who were maintaining households or family groups and spouses.

NOTE: Because of rounding, percentages may not add to 100.

SOURCE: Bennett, Claudette E. 1995. *The Black Population in the United States: March 1994 and 1993.* Current Population Reports, Population Characteristics, P20-480. Washington, DC: U.S. Bureau of the Census.

Appendix table 2-14. Trends in average mathematics and science proficiency scores, by parents' highest level of education and age of student: 1978–1992, selected years

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Level of education and year	Mathematics			Science		
	Age 9	Age 13	Age 17	Age 9	Age 13	Age 17
Graduated college:						
1978	231	284	317	232	266	309
1982	229	282	312	230	264	300
1986	231	280	314	235	264	304
1990	238	280	316	236	268	306
1992	236	283	316	239	269	308
Some education after high school:						
1978	230	273	305	237	260	296
1982	225	275	304	229	259	290
1986	229	274	305	236	258	295
1990	236	277	308	238	263	296
1992	237	278	308	237	266	296
Graduated high school:						
1978	219	263	294	223	245	284
1982	218	263	293	218	243	275
1986	218	263	293	220	245	277
1990	226	263	294	226	247	276
1992	222	263	298	222	246	280
Less than high school:						
1978	200	245	280	198	224	265
1982	199	251	279	198	225	258
1986	201	252	279	204	229	258
1990	210	253	285	210	233	261
1992	217	256	286	217	234	262
I don't know:						
1978	211	240	276	211	222	253
1982	213	252	272	211	229	252
1986	214	247	281	215	226	245
1990	223	248	277	222	224	248
1992	224	253	290	224	232	258

NOTE: Standard errors are included in source publication.

SOURCE: Educational Testing Service. 1994. *Trends in Academic Progress*. Washington, DC: U.S. Department of Education.

Appendix table 2-15. Grades 1–12 science and mathematics classes, by percentage of minority students and ability grouping: 1993

[Percent distribution]

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Grade and percent minority	Total	Ability grouping			
		Low	Average	High	Heterogeneous
Science classes					
Grades 1–4:					
Less than 10% minority	39	23	43	43	38
10% to 39% minority	34	19	29	48	37
40% or more minority	27	58	28	9	25
Grades 5–8:					
Less than 10% minority	46	24	51	55	43
10% to 39% minority	29	26	26	36	29
40% or more minority	26	50	24	10	28
Grades 9–12:					
Less than 10% minority	52	44	52	60	49
10% to 39% minority	29	28	32	30	26
40% or more minority	19	28	16	9	25
Mathematics classes					
Grades 1–4:					
Less than 10% minority	43	13	43	52	44
10% to 39% minority	33	12	38	26	33
40% or more minority	25	75	19	22	22
Grades 5–8:					
Less than 10% minority	40	23	44	53	36
10% to 39% minority	34	20	36	26	38
40% or more minority	26	57	21	21	26
Grades 9–12:					
Less than 10% minority	51	29	55	61	47
10% to 39% minority	29	29	30	30	28
40% or more minority	20	42	15	9	25

NOTES: Standard errors are included in source publication. Because of rounding, percentages may not add to 100.

SOURCE: National Science Foundation/EHR. 1993 National Survey of Science and Mathematics Education.

Appendix table 2-16. High school science and mathematics classes, by curricular emphases, activities, and ability grouping: 1993

[Percent distribution]

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Emphasis and activity	Ability grouping	
	Low	High
Curricular emphases		
Develop reasoning/inquiry skills	66	92
Increase awareness of the importance of science/mathematics in daily life	74	57
Learn basic science/mathematics concepts	81	89
Participate in selected activities at least once per week		
Science:		
Read text	55	40
Use hands-on	56	68
Mathematics:		
Do worksheet problems	70	50
Write reasoning about solving a problem	20	35

SOURCE: Weiss, Iris R. *A Profile of Science and Mathematics Education in the United States: 1993.* Research Triangle Park, NC: Research Triangle Institute.

Appendix table 2-17. Grades 7–12 science and mathematics classes, by teachers with undergraduate or graduate major in the field, class objectives, and percent minority students in class: 1993

[Percent distribution]

Page 1 of 1

Major and objective	Percent minority students Less than 10%	 10% to 39%	 40% or more
Teachers with major in field:			
Science	72	72	68
Mathematics	62	54	47
Classes emphasizing particular objectives:			
Prepare for standardized tests	24	30	42
Prepare for further study in science/mathematics	78	71	66

SOURCE: Weiss, Iris R. *A Profile of Science and Mathematics Education in the United States: 1993.* Research Triangle Park, NC: Research Triangle Institute.

Women, Minorities, and Persons With Disabilities in Science and Engineering: 1996

Appendix table 2-18. Number of high school teachers and percentage of teachers, by highest degree earned and selected school characteristics: 1990–1991

Page 1 of 1

School characteristics	Total teachers	Highest degree earned by teachers [Percent distribution] Less than bachelor's	Bachelor's	Master's or higher
Total	865,874	1.4	46.6	52.0
Total public schools	755,691	1.3	46.0	52.7
Total private schools	110,183	2.4	50.1	47.5
Public schools				
Community:				
Rural/small town	329,782	1.3	55.0	43.7
Urban fringe/large town	219,652	1.1	36.9	62.0
Central city	174,045	1.5	40.8	57.7
Minority enrollment:				
0% to 19%	410,654	0.9	46.6	52.5
20% or more	312,824	1.8	45.4	52.8
Free-lunch recipients:				
Less than 20%	437,009	1.1	42.3	56.6
20% to 49%	207,279	1.4	51.6	47.0
50% or more	74,798	1.7	53.3	45.0
Private schools				
Community:				
Rural/small town	17,443	3.6	63.9	32.5
Urban fringe/large town	31,214	1.5	48.4	50.2
Central city	49,710	2.3	46.6	51.0
Minority enrollment:				
0% to 19%	68,589	2.4	51.2	46.4
20% or more	29,778	2.0	48.0	50.0

NOTES: Because of rounding, percentages may not add to 100. Details may not add to totals because some teachers did not have corresponding school data because of school nonresponse.

SOURCE: U.S. Department of Education/NCES. 1995. *Schools and Staffing Survey: Teacher Supply, Teacher Qualifications, and Teacher Turnover: 1990–91.* Washington, DC: U.S. Department of Education.

Appendix table 2-19. Selected characteristics of American Indian education: 1990–1991

[Percent distribution]

Page 1 of 1

Teacher qualifications and school characteristics	Bureau of Indian Affairs/Tribal schools	Public schools with 25% or more enrollment of American Indians	Public schools with less than 25% enrollment of American Indians
Programs and services offered (percent distribution):			
English as a second language (ESL)	44.5	21.5	41.1
Bilingual education	63.5	30.1	13.6
Remedial math	79.6	60.7	60.3
Gifted/talented	60.6	69.8	75.0
Chapter 1	100.0	82.5	66.2
Average years of instruction in discipline (numbers):			
Mathematics	2.7	2.3	2.4
Science	2.4	2.1	2.1
Schools that served 12th graders (in percentages):			
College prep program offered	54.0	54.9	76.2
Enrolled in college prep programs	37.6	49.3	52.0
Graduated from high school	81.7	91.3	93.5
Applied to college	32.6	43.0	56.1
Teacher qualifications:			
Percent with major/minor in teaching area	66.9	71.2	71.5
Percent certified in teaching area	91.3	97.9	97.5
Mean years of teaching experience	10.1	12.8	15.2

SOURCE: U.S. Department of Education/NCES. 1995. *Characteristics of American Indian and Alaska Native Education: Results from the 1990–91 Schools and Staffing Survey.* Washington, DC: U.S. Department of Education.

Appendix table 2-20. Percentage of principals and teachers who view certain issues as serious problems, by type of school or American Indian enrollment: 1990–1991

Page 1 of 1

Issues seen as serious	Principals			Teachers		
	Bureau of Indian Affairs/ Tribal schools	Public schools with 25% or more enrollment of American Indians	Public schools with less than 25% enrollment of American Indians	Bureau of Indian Affairs/ Tribal schools	Public schools with 25% or more enrollment of American Indians	Public schools with less than 25% enrollment of American Indians
Poverty	63.3	31.7	14.5	58.5	40.3	16.9
Parental alcohol/drug abuse	55.0	30.7	6.2	65.1	41.3	11.7
Lack of parental involvement	46.5	25.7	14.3	57.7	43.0	25.3
Student absenteeism	22.7	21.0	6.4	35.4	28.8	14.0
Student tardiness	15.7	12.6	4.9	20.3	19.3	11.1
Student dropout rate	14.4	5.9	2.8	22.6	13.6	6.3
Student use of alcohol	13.7	12.5	4.2	27.6	21.0	8.1
Cultural conflict	12.2	8.8	1.2	21.3	14.2	4.2
Student apathy	11.1	15.3	7.3	31.8	28.1	20.5
Lack of academic challenge	10.0	3.8	2.7	NA	NA	NA
Disrespect for teachers	NA	NA	NA	22.8	13.4	13.0

KEY: NA = not applicable

SOURCE: U.S. Department of Education/NCES. 1995. *Characterististics of American Indian and Alaska Native Education: Results from the 1990–91 Schools and Staffing Survey.* Washington, DC: U.S. Department of Education.

Appendix table 2-21. Number of public school students and percentage of students participating in a particular program or service: 1993–1994

Page 1 of 1

Students and program/service	Number
Number of students	41,621,660
	Percent
Program/service:	
Bilingual education	3.1
English as a second language	4.0
Remedial reading	10.9
Remedial mathematics	6.9
Programs for the handicapped	6.9
Programs for the gifted and talented	6.4
Extended day/before or after day care programs	2.5

SOURCE: U.S. Department of Education/NCES. Schools and Staffing Survey, 1993–94.

Appendix table 2-22. Students age 6–21 in federally supported programs for students with disabilities, by type of disability: 1992–1993

Page 1 of 1

Disability	Number	Percent
All disabilities	4,633,674	100.0
Specific learning disabilities	2,369,385	51.1
Speech or language impairments	1,000,154	21.6
Mental retardation	533,715	11.5
Serious emotional disturbance	402,668	8.7
Multiple disabilities	103,215	2.2
Hearing impairments	60,896	1.3
Orthopedic impairments	52,921	1.1
Other health impairments	66,054	1.4
Visual impairments	23,811	0.5
Autism	15,527	0.3
Deaf-blindness	1,425	0.0
Traumatic brain injury	3,903	0.1

NOTES: Because of rounding, percentages may not add to 100. Includes students served under Chapter 1 of ESEA (SOP) and IDEA, Part B.

SOURCE: U.S. Department of Education, Office of Special Education and Rehabilitative Services. 1994. Sixteenth Annual Report to Congress on the Implementation of the Individuals with Disabilities Education Act.

Appendix table 2-23. Students age 6–21 with disabilities receiving special education services, by type of disability and educational environment: 1991–1992

[Percent distribution]

Page 1 of 1

Disability	Regular class	Resource room	Separate class	Separate school	Residential facility	Homebound/ hospital
All disabilities	34.9	36.3	23.5	3.9	0.9	0.5
Specific learning disabilities	24.7	54.2	20.0	0.9	0.1	0.1
Speech or language impairments	85.5	9.1	3.9	1.4	0.1	0.1
Mental retardation	5.1	25.4	59.2	8.8	1.2	0.3
Serious emotional disturbance	15.8	27.8	36.9	13.9	4.0	1.5
Multiple disabilities	6.2	18.1	47.1	22.6	3.8	2.2
Hearing impairments	27.0	20.5	31.2	9.6	11.5	0.1
Orthopedic impairments	32.4	21.0	34.3	7.3	0.9	4.1
Other health impairments	35.3	27.6	21.4	3.3	0.5	11.8
Visual impairments	39.6	21.2	19.6	8.5	10.6	0.4
Autism	4.7	6.9	48.5	35.9	3.1	0.9
Deaf-blindness	5.8	6.2	36.3	21.2	28.6	1.8
Traumatic brain injury	7.8	9.0	23.7	53.4	3.7	2.4

NOTES: This table reflects a compilation of data reported by the States. There are some reporting variations (e.g., estimated or incomplete data and nonstandard definitions) from State to State. Data exclude U.S. territories. Because of rounding, percentages may not add to 100.

SOURCE: U.S. Department of Education, Office of Special Education and Rehabilitative Services. 1994. Sixteenth Annual Report to Congress on the Implementation of the Individuals with Disabilities Education Act.

Appendix table 2-24. Science and mathematics classes with one or more students with disabilities, by type of disability and grade range: 1993

[Percent distribution]

Page 1 of 1

Subject and type of disability	Grades 1–4	Grades 5–8	Grades 9–12
Science:			
Learning disabled	53	54	31
Limited English proficiency	22	18	14
Mental disability	9	7	2
Physical disability	4	6	5
Mathematics:			
Learning disabled	52	40	24
Limited English proficiency	20	16	15
Mental disability	5	2	1
Physical disability	6	4	2

NOTE: Standard errors are included in source publication.

SOURCE: National Science Foundation/EHR. 1993 National Survey of Science and Mathematics Education.

Women, Minorities, and Persons With Disabilities in Science and Engineering: 1996

Appendix table 2-25. Number of college-bound seniors taking the Scholastic Aptitude Test (SAT) and their grade-point average (GPA) in high school, by sex and race/ethnicity: 1994

Page 1 of 1

Sex and GPA	Total[1]	White	Black	Asian	American Indian	Mexican American	Puerto Rican	Latin American
Numbers (in thousands):								
Total	1050.4	662.1	102.7	81.1	8.2	35.4	13.0	29.4
Male	493.1	308.5	42.4	40.0	3.8	15.6	5.6	12.9
Female	557.3	353.6	60.2	41.1	4.3	19.8	7.4	16.5
Male								
GPA (percent distribution):								
A+(97–100)	5	5	1	8	3	4	3	4
A (93–96)	11	12	4	16	6	9	8	8
A-(90–92)	13	14	6	18	10	13	9	11
B (80–89)	51	51	50	45	54	54	53	55
C (70–79)	20	18	37	13	26	19	27	21
D, E, or F (below 70)	*	*	2	1	1	1	1	1
Female								
GPA (percent distribution):								
A+(97–100)	6	6	2	9	3	4	4	4
A (93–96)	15	16	8	20	10	11	10	11
A-(90–92)	16	17	9	20	13	14	9	13
B (80–89)	51	50	56	43	57	55	56	55
C (70–79)	13	11	24	8	16	15	20	17
D, E, or F (below 70)	*	*	1	*	*	*	1	*

[1] Total includes 11 percent of students who did not fill out a descriptive questionnaire, or who listed themselves as "other."

KEY: * = Less than 0.5 percent

NOTE: Because of rounding, details may not add to totals.

SOURCE: College Entrance Examination Board. *College Bound Seniors, 1994 SAT Profile, Profile of SAT and Achievement Test Takers,* p. 2 of each of 10 separate reports for each sex and race/ethnicity. Princeton, NJ: Educational Testing Service.

Appendix table 2-26. Scholastic Aptitude Test (SAT) mean scores of college-bound seniors, by test component, sex, and race/ethnicity: 1984–1994

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Test component, sex, and race/ethnicity	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Verbal:											
Total	426	431	431	430	428	427	424	422	423	424	423
Male	433	437	437	435	435	434	429	426	428	428	425
Female	420	425	426	425	422	421	419	418	419	420	421
White	445	449	NA	447	445	446	442	441	442	444	443
Black	342	346	NA	351	353	351	352	351	352	353	352
Asian	398	404	NA	405	408	409	410	411	413	415	416
American Indian	390	392	NA	393	393	384	388	393	395	400	396
Mexican American	376	382	NA	379	382	381	380	377	372	374	372
Puerto Rican	358	368	NA	360	355	360	359	361	366	367	367
Latin American	NA	NA	NA	387	387	389	383	382	383	384	383
Mathematics:											
Total	471	475	475	476	476	476	476	474	476	478	479
Male	495	499	501	500	498	500	499	497	499	502	501
Female	449	452	451	453	455	454	455	453	456	457	460
White	487	490	NA	489	490	491	491	489	491	494	495
Black	373	376	NA	377	384	386	385	385	385	388	388
Asian	519	518	NA	521	522	525	528	530	532	535	535
American Indian	427	428	NA	432	435	428	437	437	442	447	441
Mexican American	420	426	NA	424	428	430	429	427	425	428	427
Puerto Rican	405	409	NA	400	402	406	405	406	406	409	411
Latin American	NA	NA	NA	432	433	436	434	431	433	433	435

KEY: NA = not available

NOTE: Score range is 200 to 800 for each component.

SOURCE: College Entrance Examination Board. 1994. *College Bound Seniors, 1994 SAT Profile, Profile of SAT and Achievement Test Takers,* p. 1 of each of 10 separate reports for each sex and race/ethnicity. Princeton, NJ: Educational Testing Service.

Appendix table 2-27. Percentage of college-bound seniors who took natural science or mathematics in high school, by coursework, sex, and race/ethnicity: 1994

Page 1 of 1

Coursework	Total	Male	Female	White	Black	Asian	American Indian	Mexican American	Puerto Rican	Latin American
Biology	97	97	97	98	97	95	96	96	96	97
Chemistry	83	83	83	85	77	89	75	77	77	80
Geography/earth/space	44	45	44	47	43	34	46	27	50	39
Physics	46	51	41	47	35	65	34	35	40	44
Honors course taken	26	26	26	27	16	37	18	22	17	24
4 or more years natural science	47	50	45	50	37	55	39	30	42	42
Algebra	96	96	96	97	96	94	96	97	95	96
Geometry	93	93	93	94	88	94	90	94	89	92
Trigonometry	54	56	53	55	43	69	44	43	49	51
Precalculus	35	37	34	36	22	53	25	29	27	31
Calculus	21	24	19	22	11	40	12	15	11	17
Honors course taken	26	27	26	27	16	40	17	23	17	23
4 or more years mathematics	70	71	68	71	63	78	62	62	65	67

SOURCE: College Entrance Examination Board. 1994. *College Bound Seniors, 1994 SAT Profile, Profile of SAT and Achievement Test Takers,* p. 5 of each of 10 separate reports for each sex and race/ethnicity. Princeton, NJ: Educational Testing Service.

Appendix table 2-28. Percentage distribution of scores and mean scores on the Scholastic Aptitude Test (SAT) for college-bound seniors, by test component, sex, and race/ethnicity: 1994

Page 1 of 1

Test component and score	Total	Male	Female	White	Black	Asian	American Indian	Mexican American	Puerto Rican	Latin American
Verbal:										
700–800	1	1	1	1	*	2	*	*	*	*
600–690	6	6	6	7	1	9	3	2	2	3
500–599	18	18	18	22	7	17	14	9	9	13
400–499	31	31	32	36	21	26	30	26	26	27
300–399	29	28	30	27	40	25	35	38	38	34
Below 300	13	13	13	7	30	22	17	23	26	23
Mean score	423	425	421	443	352	416	396	372	367	383
Mathematics:										
700–800	4	7	3	5	*	13	1	1	1	1
600–690	14	17	11	16	3	22	7	6	6	8
500–599	25	27	24	29	12	26	22	19	16	20
400–499	29	26	30	30	26	22	31	33	30	29
300–399	20	17	24	17	38	14	28	31	34	30
Below 300	6	5	8	4	19	4	9	10	14	11
Mean score	479	501	460	495	388	535	441	427	411	435

KEY: * = less than 0.5 percent

NOTES: Scores are for college-bound seniors. Because of rounding, percentages may not add to 100.

SOURCE: College Entrance Examination Board. 1994. *College Bound Seniors, 1994 SAT Profile, Profile of SAT and Achievement Test Takers*, p. 9 of each of 10 separate reports for each sex and race/ethnicity. Princeton, NJ: Educational Testing Service.

Appendix table 2-29. Achievement test scores in science and mathematics and corresponding Scholastic Aptitude Test (SAT) mathematics and verbal scores for college-bound seniors, by achievement test, sex, and race/ethnicity: 1994

Page 1 of 1

Achievement and SAT tests	Total	Male	Female	White	Black	Asian	American Indian	Mexican American	Puerto Rican	Latin American
Chemistry	582	599	559	585	516	592	542	504	513	543
SAT math score[1]	650	667	625	650	565	669	608	576	579	598
SAT verbal score[2]	544	548	538	561	495	520	508	481	495	511
Biology	555	572	541	562	490	553	509	478	515	527
SAT math score[1]	608	634	586	610	517	629	553	522	547	562
SAT verbal score[2]	540	546	535	551	482	520	493	463	502	505
Physics	604	618	565	609	534	608	566	524	538	572
SAT math score[1]	671	679	650	674	598	682	644	606	627	644
SAT verbal score[2]	543	543	541	568	514	504	537	484	507	516
Mathematics level I	550	569	535	557	487	572	513	471	520	508
SAT math score[1]	569	595	549	581	492	584	535	473	527	516
SAT verbal score[2]	499	502	498	522	455	466	482	418	466	458
Mathematics level II	662	676	644	663	588	681	626	584	623	622
SAT math score[1]	654	672	632	659	574	666	617	569	606	606
SAT verbal score[2]	549	550	548	570	504	516	533	471	514	511
Mathematics level IIc	674	695	650	672	622	692	629	645	649	654
SAT math score[1]	673	696	647	672	610	686	628	639	645	646
SAT verbal score[2]	576	577	575	588	537	548	553	525	566	558

[1] Mean score on the mathematics portion of the SAT for seniors who took Achievement test in that subject.

[2] Mean score on the verbal portion of the SAT for seniors who took Achievement test in that subject.

NOTE: The score range is 200 to 800 for the Achievement test and the mathematics and verbal portions of the SAT.

SOURCE: College Entrance Examination Board. 1994. *College Bound Seniors, 1994 SAT Profile, Profile of SAT and Achievement Test Takers,* p. 11 of each of 10 separate reports for each sex and race/ethnicity. Princeton, NJ: Educational Testing Service.

Appendix table 2-30. Intended undergraduate majors of college-bound seniors taking the Scholastic Aptitude Test (SAT), by area of study, sex, and race/ethnicity: 1994

[Percent distribution]

Page 1 of 1

Sex and area of study	Total	White	Black	Asian	American Indian	Mexican American	Puerto Rican	Latin American
Total:								
Science and engineering	33	34	33	35	31	33	34	35
Agriculture/natural resources	2	2	—	—	2	1	1	1
Biological sciences	5	6	3	7	5	4	4	5
Computer sciences	3	2	5	4	3	3	4	3
Engineering	9	9	11	14	8	11	10	11
Mathematics	1	1	—	1	—	—	—	—
Physical sciences	1	2	1	1	1	1	1	1
Social sciences/history	12	12	13	8	12	13	14	14
Non-science and -engineering	67	66	67	65	69	67	66	65
Business and commerce	14	13	17	16	13	15	16	16
Education	8	9	6	3	8	7	6	5
Health and allied services	19	18	22	27	20	19	19	19
Other	26	26	22	19	28	26	25	25
Male:								
Science and engineering	40	39	40	42	37	38	38	40
Agriculture/natural resources	2	3	1	—	3	1	1	1
Biological sciences	5	5	3	6	5	3	4	4
Computer sciences	4	4	7	6	4	4	5	5
Engineering	17	15	19	22	13	19	17	19
Mathematics	1	1	1	1	1	1	—	—
Physical sciences	2	2	1	2	2	1	1	1
Social sciences/history	9	9	8	5	9	9	10	10
Non-science and -engineering	60	61	60	58	63	62	62	60
Business and commerce	15	15	19	15	15	14	16	17
Education	4	5	4	1	5	5	3	2
Health and allied services	13	12	12	22	13	15	13	14
Other	28	29	25	20	30	28	30	27
Female:								
Science and engineering	28	29	30	27	29	29	31	31
Agriculture/natural resources	1	2	—	—	2	1	1	1
Biological sciences	6	6	3	7	6	4	5	5
Computer sciences	2	1	5	2	2	2	3	2
Engineering	3	3	5	5	3	4	4	4
Mathematics	—	1	—	1	—	—	—	—
Physical sciences	1	1	—	1	1	1	—	1
Social sciences/history	15	15	17	11	15	17	18	18
Non-science and -engineering	72	71	70	73	71	71	69	69
Business and commerce	13	11	16	17	12	16	16	16
Education	11	13	6	4	11	9	7	7
Health and allied services	24	22	29	31	25	23	23	23
Other	24	25	19	21	23	23	23	23

KEY: — = less than 1 percent

NOTES: SAT mathematics scores are the mean mathematics scores on the aptitude portion of the SAT. Scores range from 200 to 800. Because of rounding, percentages may not add to 100.

SOURCE: College Entrance Examination Board. 1994. *College Bound Seniors, 1994 SAT Profile, Profile of SAT and Achievement Test Takers*, p. 8 of each of 10 separate reports for each sex and race/ethnicity. Princeton, NJ: Educational Testing Service.

Appendix table 2-31. Academic preparation and corresponding mean American College Testing (ACT) scores, by sex, test component, and race/ethnicity: 1994

Page 1 of 1

Sex and test component	Total[1]	White	Black	Asian	American Indian	Mexican American	Puerto Rican/ Other Hispanic
Total							
Students taking core subjects or more	478,885	356,512	41,533	17,686	4,995	15,411	8,685
Scores:							
English	21.5	22.2	17.5	21.3	19.2	18.8	19.9
Math	21.5	22.0	17.8	23.8	19.6	19.7	20.4
Reading	22.5	23.2	18.1	22.3	20.4	19.8	20.8
Science/reasoning	22.1	22.7	18.2	22.2	20.4	19.8	20.4
Composite/score	22.0	22.6	18.0	22.5	20.0	19.6	20.5
Students taking less than core subjects	359,974	260,155	39,275	7,952	5,533	13,918	5,950
Scores:							
English	18.6	19.4	15.1	18.4	16.4	16.1	16.6
Math	18.3	18.7	15.7	21.1	16.7	16.9	17.3
Reading	19.6	20.4	16.0	19.4	17.7	17.3	17.8
Science/reasoning	19.4	20.1	16.6	20.0	18.1	17.7	18.0
Composite/score	19.1	19.8	16.0	19.9	17.3	17.1	17.6
Male							
Students taking core subjects or more		160,530	15,673	7,944	2,226	6,801	3,488
Scores:							
English		21.8	16.9	20.7	18.7	18.6	19.5
Math		22.7	18.1	24.5	20.1	20.4	21.3
Reading		23.1	17.7	22.0	20.2	19.8	20.8
Science/reasoning		23.5	18.4	22.8	20.9	20.5	21.2
Composite/score		22.9	17.9	22.6	20.1	19.9	20.8
Students taking less than core subjects		112,945	16,747	3,700	2,471	5,902	2,405
Scores:							
English		18.7	14.6	17.9	16.0	15.7	16.2
Math		19.3	15.9	21.6	17.1	17.4	17.8
Reading		20.0	15.7	19.1	17.5	17.1	17.5
Science/reasoning		20.6	16.7	20.5	18.4	18.0	18.4
Composite/score		19.8	15.8	19.9	17.4	17.2	17.6
Female							
Students taking core subjects or more		195,982	25,860	9,742	2,769	8,610	5,197
Scores:							
English		22.6	18.0	21.7	19.6	19.0	20.1
Math		21.3	17.7	23.3	19.1	19.1	19.8
Reading		23.3	18.3	22.6	20.6	19.8	20.8
Science/reasoning		22.0	18.0	21.7	19.9	19.2	19.9
Composite/score		22.4	18.1	22.4	19.9	19.4	20.3
Students taking less than core subjects		147,210	22,528	4,252	3,062	8,016	3,545
Scores:							
English		19.9	15.5	18.8	16.7	16.4	16.9
Math		18.3	15.6	20.7	16.4	16.6	17.0
Reading		20.6	16.2	19.7	17.8	17.4	18.0
Science/reasoning		19.7	16.5	19.6	17.8	17.4	17.7
Composite/score		19.8	16.1	19.8	17.3	17.1	17.5

[1] Total includes 9 percent of students who did not answer the question.

SOURCE: American College Testing Program. 1994. *ACT High School Profile Report. High School Graduating Class of 1994 National Report.* Iowa City: American College Testing Program.

Appendix table 2-32. Estimated family income and corresponding mean verbal and mathematics Scholastic Aptitude Test (SAT) scores of college-bound seniors, by sex and race/ethnicity: 1994

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Test component and estimated family income	Total	Male	Female	White	Black	Asian	American Indian	Mexican American	Puerto Rican	Latin American
Total (percent distribution):										
Less than $10,000	6	5	7	2	15	11	6	13	17	14
$10,000–$20,000	11	9	12	7	22	15	14	22	20	22
$20,000–$30,000	13	13	14	12	20	14	16	20	18	18
$30,000–$40,000	16	16	16	16	16	14	18	16	15	15
$40,000–$50,000	13	13	12	14	9	9	12	10	9	8
$50,000–$60,000	11	11	11	13	6	8	10	7	7	6
$60,000–$70,000	8	9	8	9	4	7	8	4	4	4
$70,000 or more	23	25	21	27	8	21	17	8	10	13
SAT verbal scores:										
Less than $10,000	350	354	348	403	319	335	361	328	323	328
$10,000–$20,000	377	378	376	414	334	357	377	346	344	350
$20,000–$30,000	402	403	401	423	349	392	386	366	363	375
$30,000–$40,000	416	417	416	428	360	415	393	382	380	396
$40,000–$50,000	429	429	428	436	370	435	400	396	392	412
$50,000–$60,000	437	437	437	443	374	447	406	403	405	420
$60,000–$70,000	446	445	447	451	384	456	414	408	398	433
$70,000 or more	469	469	470	472	408	482	428	429	431	451
SAT mathematics scores:										
Less than $10,000	416	446	397	458	358	482	393	388	360	380
$10,000–$20,000	435	459	418	461	371	500	418	406	388	403
$20,000–$30,000	454	477	436	471	385	515	428	422	404	426
$30,000–$40,000	469	490	450	478	395	528	438	434	421	445
$40,000–$50,000	482	503	463	487	404	539	449	449	436	459
$50,000–$60,000	492	512	473	496	411	551	449	455	454	473
$60,000–$70,000	502	520	485	506	420	558	467	461	449	482
$70,000 or more	531	549	512	530	445	593	480	480	486	506

NOTES: Because of rounding, percentages may not add to 100. The score range is 200 to 800 for the mathematics and verbal portions of the SAT.

SOURCE: College Entrance Examination Board. 1994. *College Bound Seniors, 1994 SAT Profile, Profile of SAT and Achievement Test Takers,* p. 7 of each of 10 separate reports for each sex and race/ethnicity. Princeton, NJ: Educational Testing Service.

Appendix table 2-33. Highest level of parents' education and corresponding mean Scholastic Aptitude Test (SAT) verbal and mathematics scores of college-bound seniors, by sex and race/ethnicity: 1994

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Test component and highest level of parent's education	Total	Male	Female	White	Black	Asian	American Indian	Mexican American	Puerto Rican	Latin American
Total (percent distribution):										
Less than high school diploma	5	4	5	2	6	11	5	29	13	18
High school diploma	36	34	38	35	51	[illegible]	44	41	42	36
Associate's degree	8	8	8	8	10	5	10	7	9	7
Bachelor's degree	27	28	26	29	20	30	24	13	20	18
Graduate degree	24	26	23	26	13	28	17	10	16	21
SAT verbal scores:										
Less than high school diploma	336	339	334	371	306	331	329	330	320	323
High school diploma	393	394	392	411	337	377	377	371	359	372
Associate's degree	406	406	407	420	351	392	388	388	365	389
Bachelor's degree	443	444	443	455	376	423	421	415	382	413
Graduate degree	478	478	478	486	402	487	440	427	411	428
Total	423	425	421	443	352	416	396	372	367	383
SAT mathematics scores:										
Less than high school diploma	407	433	389	420	350	479	378	391	356	377
High school diploma	445	467	428	460	374	502	421	426	398	420
Associate's degree	458	478	442	472	386	500	435	437	406	435
Bachelor's degree	503	523	484	510	410	547	468	466	434	466
Graduate degree	535	556	516	540	435	586	483	478	463	487
Total	479	501	460	495	388	535	441	427	411	435

NOTES: Because of rounding, percentages may not add to 100. The score range is 200 to 800 for the mathematics and verbal portions of the SAT.

SOURCE: College Entrance Examination Board. 1994. *College Bound Seniors, 1994 SAT Profile, Profile of SAT and Achievement Test Takers*, p. 8 of each of 10 separate reports for each sex and race/ethnicity. Princeton, NJ: Educational Testing Service.

Appendix table 2-34. Citizenship status and corresponding mean verbal and mathematics Scholastic Aptitude Test (SAT) scores of college-bound seniors, by sex and race/ethnicity: 1994

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Test component and citizenship status	Total	Male	Female	White	Black	Asian	American Indian	Mexican American	Puerto Rican	Latin American
Total (percent distribution):										
U.S. citizen/naturalized citizen	92	92	92	98	93	59	98	89	99	68
Permanent resident or refugee	5	5	5	1	5	27	1	9	1	23
Citizen of another country	3	4	3	1	2	15	1	3	*	9
SAT verbal scores:										
U.S. citizen/naturalized citizen	430	433	428	444	352	454	398	378	368	402
Permanent resident or refugee	360	364	356	408	337	359	332	330	332	343
Citizen of another country	386	388	384	419	381	374	351	324	282	362
SAT mathematics scores:										
U.S. citizen/naturalized citizen	480	503	461	495	387	536	442	431	411	445
Permanent resident or refugee	471	501	446	510	383	514	408	397	373	402
Citizen of another country	527	548	504	533	437	576	463	410	383	458

KEY: * = less than 0.5 percent

NOTES: Because of rounding, percentages may not add to 100. The score range is 200 to 800 for the mathematics and verbal portions of the SAT.

SOURCE: College Entrance Examination Board. 1994. *College Bound Seniors, 1994 SAT Profile, Profile of SAT and Achievement Test Takers,* p. 6 of each of 10 separate reports for each sex and race/ethnicity. Princeton, NJ: Educational Testing Service.

Appendix table 2-35. Mean Scholastic Aptitude Test (SAT) scores of college-bound seniors, by disability status, test component, sex, and race/ethnicity: 1994

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Test component and disability status	Total	Male	Female	White	Black	Asian	American Indian	Mexican American	Puerto Rican	Latin American
Total (percent distribution):										
Disabling condition reported	4	4	4	4	4	3	6	3	5	4
No disabling condition reported	96	96	96	96	96	97	94	97	95	96
SAT verbal scores:										
Disabling condition reported	391	394	389	405	325	382	366	355	334	363
No disabling condition reported	427	430	424	445	354	419	399	373	369	384
SAT mathematics scores:										
Disabling condition reported	436	452	419	445	359	489	401	408	378	404
No disabling condition reported	483	508	463	498	390	538	445	428	413	437

NOTE: The score range is 200 to 800 for the mathematics and verbal portions of the SAT.

SOURCE: College Entrance Examination Board. 1994. *College Bound Seniors, 1994 SAT Profile, Profile of SAT and Achievement Test Takers,* p. 1 of each of 10 separate reports for each sex and race/ethnicity. Princeton, NJ: Educational Testing Service.

Appendix table 3-1. Total and full-time undergraduate enrollment at all institutions, by sex and race/ethnicity: fall 1980–1993, selected years

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Enrollment status, sex, and race/ethnicity	1980	1986	1990	1991	1992	1993
Total undergraduate enrollment:						
Total, all races and ethnicities	10,603,579	10,952,167	12,011,657	12,595,335	12,693,778	12,482,813
Nonresident aliens	210,753	203,088	227,337	235,205	258,661	269,041
White, non-Hispanic	8,486,774	8,568,121	9,232,090	9,508,527	9,388,226	9,103,638
Asian	251,713	391,550	491,134	565,166	620,463	642,585
Underrepresented minorities	1,664,339	1,789,407	2,061,096	2,286,437	2,426,428	2,467,549
Black, non-Hispanic	1,020,921	1,000,963	1,125,591	1,231,252	1,282,732	1,290,647
American Indian	77,961	83,099	95,135	105,839	110,879	112,710
Hispanic	555,457	705,345	840,370	949,346	1,032,817	1,064,192
Men, all races and ethnicities	5,052,234	5,078,768	5,396,557	5,632,690	5,644,113	5,547,126
Nonresident aliens	140,229	129,362	129,275	133,630	143,640	146,912
White, non-Hispanic	4,057,626	3,983,479	4,165,862	4,273,310	4,195,726	4,067,940
Asian	129,876	205,623	250,287	284,673	308,564	318,225
Underrepresented minorities	724,503	760,304	851,133	941,077	996,183	1,014,049
Black, non-Hispanic	428,913	404,379	440,209	478,648	496,123	499,606
American Indian	34,790	36,367	39,692	44,186	46,572	47,226
Hispanic	260,800	319,558	371,232	418,243	453,488	467,217
Women, all races and ethnicities	5,551,345	5,873,399	6,615,100	6,962,645	7,049,665	6,935,687
Nonresident aliens	70,525	73,726	98,062	101,575	115,021	122,129
White, non-Hispanic	4,429,148	4,584,642	5,066,228	5,235,217	5,192,500	5,035,698
Asian	121,837	185,927	240,847	280,493	311,899	324,360
Underrepresented minorities	929,835	1,029,104	1,209,963	1,345,360	1,430,245	1,453,500
Black, non-Hispanic	592,008	596,585	685,382	752,604	786,609	791,041
American Indian	43,170	46,732	55,443	61,653	64,307	65,484
Hispanic	294,657	385,787	469,138	531,103	579,329	596,975
Full-time undergraduate enrollment:						
Total, all races and ethnicities	6,464,633	6,455,051	7,058,865	7,346,260	7,369,223	7,302,852
Nonresident aliens	166,114	157,627	167,228	176,693	188,885	196,716
White, non-Hispanic	5,133,039	5,023,090	5,403,802	5,510,013	5,437,032	5,313,431
Asian	144,691	230,083	298,070	339,467	367,609	386,728
Underrepresented minorities	1,020,788	1,044,252	1,189,765	1,320,087	1,375,697	1,405,977
Black, non-Hispanic	650,728	604,104	670,892	733,802	753,189	762,044
American Indian	40,471	42,899	50,769	57,339	60,942	62,697
Hispanic	329,589	397,249	468,104	528,946	561,566	581,236
Men, all races and ethnicities	3,268,722	3,185,125	3,367,828	3,484,304	3,473,410	3,430,498
Nonresident aliens	116,471	103,679	99,043	103,606	108,439	111,278
White, non-Hispanic	2,622,125	2,502,627	2,609,128	2,648,578	2,598,252	2,531,806
Asian	77,250	124,431	155,377	174,480	187,040	195,529
Underrepresented minorities	452,876	454,388	504,280	557,640	579,679	591,885
Black, non-Hispanic	279,140	255,114	275,249	299,931	305,603	309,283
American Indian	19,176	19,704	22,494	25,081	26,785	27,683
Hispanic	154,560	179,570	206,537	232,628	247,291	254,919
Women, all races and ethnicities	3,195,911	3,269,926	3,691,037	3,861,956	3,895,813	3,872,354
Nonresident aliens	49,644	53,948	68,185	73,087	80,446	85,438
White, non-Hispanic	2,510,914	2,520,463	2,794,674	2,861,435	2,838,780	2,781,625
Asian	67,441	105,651	142,693	164,987	180,569	191,199
Underrepresented minorities	567,912	589,864	685,485	762,447	796,018	814,092
Black, non-Hispanic	371,588	348,990	395,643	433,871	447,586	452,761
American Indian	21,295	23,195	28,275	32,258	34,157	35,014
Hispanic	175,029	217,679	261,567	296,318	314,275	326,317

NOTES: Other/unknown races and ethnicities have been distributed proportionately across groups. Because of rounding, details may not add to totals.

SOURCES: U.S. Department of Education/NCES. Opening Fall Enrollment Survey; tabulations by National Science Foundation/SRS.

Appendix table 3-2. Total and full-time enrollment of first-time students at all institutions, by sex and race/ethnicity: fall 1980–1993, selected years

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Enrollment status, sex, and race/ethnicity	1980	1986	1990	1991	1992	1993
Total first-year enrollment:						
Total, all races and ethnicities	2,625,138	2,235,370	2,295,150	2,313,240	2,219,522	2,202,468
Nonresident aliens	41,800	30,961	39,395	41,749	42,014	41,823
White, non-Hispanic	2,070,753	1,742,720	1,715,881	1,691,467	1,600,109	1,561,114
Asian	56,473	75,144	97,098	104,021	108,570	116,223
Underrepresented minorities	456,112	386,545	442,776	476,003	468,829	483,308
Black, non-Hispanic	280,142	217,595	244,394	261,385	254,514	252,684
American Indian	21,791	18,247	20,956	22,874	21,722	21,807
Hispanic	154,180	150,702	177,426	191,744	192,593	208,817
Men, all races and ethnicities	1,233,446	1,051,677	1,061,145	1,082,912	1,027,665	1,025,237
Nonresident aliens	25,907	18,574	22,047	23,298	23,201	22,588
White, non-Hispanic	979,822	825,110	797,656	798,502	744,954	731,803
Asian	29,209	39,363	49,108	51,752	54,268	58,018
Underrepresented minorities	198,509	168,630	192,334	209,360	205,242	212,828
Black, non-Hispanic	118,444	91,662	102,654	112,454	107,942	107,890
American Indian	9,730	8,387	9,449	10,211	9,913	9,823
Hispanic	70,335	68,580	80,231	86,695	87,387	95,115
Women, all races and ethnicities	1,391,692	1,183,693	1,234,005	1,230,328	1,191,857	1,177,231
Nonresident aliens	15,893	12,387	17,348	18,451	18,813	19,235
White, non-Hispanic	1,090,931	917,610	918,225	892,965	855,155	829,311
Asian	27,265	35,781	47,990	52,269	54,302	58,205
Underrepresented minorities	257,604	217,915	250,442	266,643	263,587	270,480
Black, non-Hispanic	161,699	125,933	141,740	148,931	146,572	144,794
American Indian	12,060	9,860	11,507	12,663	11,809	11,984
Hispanic	83,845	82,122	97,195	105,049	105,206	113,702
Full-time, first-year enrollment:						
Total, all races and ethnicities	1,782,560	1,601,916	1,651,680	1,684,047	1,636,489	1,645,145
Nonresident aliens	31,813	24,881	30,470	32,273	32,482	32,843
White, non-Hispanic	1,408,761	1,252,689	1,238,988	1,236,339	1,192,005	1,182,988
Asian	35,447	52,368	70,653	75,677	79,193	84,167
Underrepresented minorities	306,539	271,978	311,569	339,758	332,809	345,147
Black, non-Hispanic	194,573	159,476	180,198	195,411	186,830	188,006
American Indian	12,065	11,233	13,483	14,736	14,585	14,781
Hispanic	99,901	101,269	117,888	129,611	131,394	142,360
Men, all races and ethnicities	875,087	772,361	786,034	810,710	773,717	777,375
Nonresident aliens	20,801	15,322	17,507	18,475	18,277	18,102
White, non-Hispanic	701,907	611,003	597,180	604,373	570,371	566,768
Asian	18,575	27,590	36,033	37,666	39,531	41,920
Underrepresented minorities	133,804	118,445	135,314	150,196	145,538	150,585
Black, non-Hispanic	82,771	67,428	76,372	85,544	79,986	80,518
American Indian	5,773	5,304	6,262	6,766	6,791	6,804
Hispanic	45,260	45,714	52,680	57,886	58,761	63,263
Women, all races and ethnicities	907,473	829,555	865,646	873,337	862,772	867,770
Nonresident aliens	11,012	9,559	12,963	13,798	14,205	14,741
White, non-Hispanic	706,854	641,685	641,808	631,966	621,634	616,220
Asian	16,872	24,778	34,620	38,011	39,662	42,247
Underrepresented minorities	172,735	153,533	176,255	189,562	187,271	194,562
Black, non-Hispanic	111,802	92,048	103,826	109,867	106,844	107,488
American Indian	6,291	5,929	7,221	7,970	7,794	7,977
Hispanic	54,641	55,556	65,208	71,725	72,633	79,097

NOTES: Other/unknown races and ethnicities have been distributed proportionately across groups. Because of rounding, details may not add to totals.

SOURCES: U.S. Department of Education/NCES. Opening Fall Enrollment Survey; tabulations by National Science Foundation/SRS.

Appendix table 3-3. Selected characteristics of students enrolled in postsecondary institutions, by disability status: fall 1992–1993

[Percent distribution]

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Student characteristic and type of institution	Students without disabilities	Students with disabilities
Total	93.6	6.5
Dependency status:		
Dependent	95.6	4.5
Independent	91.7	8.3
Sex:		
Men	92.4	7.6
Women	94.5	5.5
Veteran of U.S. armed forces:		
No	94.2	5.8
Yes	85.0	15.0
Age as of December 31, 1992:		
Younger than 24	95.5	4.5
24 to 29	94.1	5.9
30 or older	89.5	10.5
Undergraduate major:		
Total science and engineering	94.4	5.6
Agriculture	91.0	9.0
Computer science and mathematics	93.1	6.9
Biological sciences	95.7	4.3
Physical sciences	93.6	6.4
Psychology	93.4	6.6
Social sciences	95.5	4.5
Engineering	94.9	5.1
Non-science and -engineering	93.4	6.6
Attendance pattern:		
Full-time/full year: 1 institution	94.8	5.2
Full-time/full year: more than 1 institution	94.0	6.0
Full-time/part year	92.0	8.0
Part-time/full year: 1 institution	93.2	6.8
Part-time/full year: more than 1 institution	95.4	4.6
Part-time/part year	93.0	7.0
Institutional type (level and control):		
Public, less-than-2-year	88.0	12.0
Public, 2-year	92.1	7.9
Public, 4-year, non-doctorate-granting	94.6	5.4
Public, 4-year, doctorate-granting	95.7	4.3
Private, not-for-profit, less-than-4-year	93.7	6.3
Private, not-for-profit, 4-year, non-Ph.D.-granting	94.9	5.1
Private, not-for-profit, 4 year, Ph.D.-granting	96.7	3.3

NOTE: Because of rounding, percentages may not add to 100.

SOURCE: U.S. Department of Education/NCES. 1992–93 National Postsecondary Student Aid Study. Table generation system.

Appendix table 3-4. Undergraduate students' receipt of financial aid, by disability status and type of disability: 1992–1993

[Percent distribution]

Page 1 of 1

Disability status and type of disability	Did not receive financial aid in 1992–1993	Received financial aid in 1992–1993
Students without disabilities	63.5	36.5
Students with disabilities	63.0	37.0
Type of disability		
Hearing impaired or deaf:		
No	63.3	36.7
Yes	70.5	29.5
Learning disability:		
No	63.4	36.6
Yes	68.0	32.0
Orthopedic limitation:		
No	63.5	36.5
Yes	58.6	41.4
Other health-related disabilities:		
No	63.5	36.5
Yes	57.3	42.7
Partially sighted or blind:		
No	63.5	36.6
Yes	59.9	40.1
Speech limitation:		
No	63.4	36.6
Yes	72.4	27.6

NOTE: Because of rounding, percentages may not add to 100.

SOURCE: U.S. Department of Education/NCES. 1992–93 National Postsecondary Student Aid Study. Table generation system.

Appendix table 3-5. Total and full-time enrollment of undergraduate students at 4-year institutions, by sex and race/ethnicity: fall 1980–1993, selected years

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Enrollment status, sex, and race/ethnicity	1980	1986	1990	1991	1992	1993
Total undergraduate enrollment:						
Total, all races and ethnicities	6,218,516	6,371,929	6,884,224	7,022,283	7,052,923	7,001,113
Nonresident aliens	148,155	152,478	152,465	161,528	168,090	177,444
White, non-Hispanic	5,044,758	5,075,183	5,369,207	5,382,968	5,331,923	5,222,204
Asian	127,762	207,239	275,522	306,832	327,930	343,884
Underrepresented minorities	897,842	937,030	1,087,030	1,170,955	1,224,980	1,257,581
Black, non-Hispanic	567,870	541,381	623,515	664,924	692,817	704,731
American Indian	33,199	35,804	43,461	46,616	50,550	52,242
Hispanic	296,773	359,845	420,054	459,415	481,613	500,608
Men, all races and ethnicities	3,065,868	3,061,998	3,208,718	3,260,851	3,263,791	3,233,618
Nonresident aliens	101,538	99,788	92,204	95,491	97,975	101,721
White, non-Hispanic	2,507,053	2,452,598	2,522,814	2,522,255	2,490,239	2,435,438
Asian	66,918	109,349	141,968	155,825	165,255	172,298
Underrepresented minorities	390,358	400,263	451,732	487,280	510,322	524,161
Black, non-Hispanic	238,501	223,310	249,007	265,469	277,736	282,306
American Indian	15,138	16,062	18,457	19,778	21,801	22,373
Hispanic	136,718	160,891	184,268	202,033	210,785	219,482
Women, all races and ethnicities	3,152,648	3,309,931	3,675,506	3,761,432	3,789,132	3,767,495
Nonresident aliens	46,616	52,689	60,261	66,037	70,115	75,723
White, non-Hispanic	2,537,705	2,622,585	2,846,393	2,860,713	2,841,684	2,786,766
Asian	60,843	97,890	133,554	151,007	162,675	171,586
Underrepresented minorities	507,484	536,767	635,298	683,675	714,658	733,420
Black, non-Hispanic	329,368	318,071	374,508	399,455	415,081	422,425
American Indian	18,061	19,742	25,004	26,838	28,749	29,869
Hispanic	160,055	198,954	235,786	257,382	270,828	281,126
Full-time undergraduate enrollment:						
Total, all races and ethnicities	4,788,540	4,825,071	5,202,866	5,293,919	5,316,654	5,283,347
Nonresident aliens	127,760	128,704	128,017	137,060	143,320	148,649
White, non-Hispanic	3,874,519	3,834,381	4,037,727	4,030,362	3,987,568	3,913,669
Asian	98,971	163,828	222,185	247,251	265,330	278,555
Underrepresented minorities	687,290	698,158	814,937	879,246	920,436	942,474
Black, non-Hispanic	437,018	406,690	469,237	500,184	520,319	528,062
American Indian	23,428	25,277	30,784	33,179	35,959	37,356
Hispanic	226,844	266,190	314,916	345,883	364,158	377,056
Men, all races and ethnicities	2,424,859	2,393,569	2,497,975	2,530,942	2,533,410	2,510,079
Nonresident aliens	89,954	85,798	78,554	82,231	84,684	86,860
White, non-Hispanic	1,980,396	1,916,590	1,958,388	1,949,114	1,923,016	1,881,922
Asian	52,139	87,002	114,707	125,994	134,300	140,242
Underrepresented minorities	302,370	304,179	346,326	373,603	391,410	401,055
Black, non-Hispanic	186,208	172,997	193,427	206,315	214,901	218,306
American Indian	11,183	11,650	13,694	14,608	16,055	16,712
Hispanic	104,979	119,532	139,205	152,680	160,454	166,037
Women, all races and ethnicities	2,363,681	2,431,502	2,704,891	2,762,977	2,783,244	2,773,268
Nonresident aliens	37,806	42,905	49,463	54,829	58,636	61,789
White, non-Hispanic	1,894,124	1,917,791	2,079,339	2,081,248	2,064,552	2,031,747
Asian	46,832	76,826	107,478	121,257	131,030	138,313
Underrepresented minorities	384,920	393,979	468,611	505,643	529,026	541,419
Black, non-Hispanic	250,810	233,693	275,810	293,869	305,418	309,756
American Indian	12,245	13,628	17,090	18,571	19,904	20,644
Hispanic	121,864	146,658	175,711	193,203	203,704	211,019

NOTES: Other/unknown races and ethnicities have been distributed proportionately across groups.
Because of rounding, details may not add to totals.

SOURCES: U.S. Department of Education/NCES. Opening Fall Enrollment Survey; tabulations by National Science Foundation/SRS.

Appendix table 3-6. Total and full-time enrollment of first-time, first-year students at 4-year institutions, by sex and race/ethnicity: fall 1980–1993, selected years

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Enrollment status, sex, and race/ethnicity	1980	1986	1990	1991	1992	1993
Total first-time, first-year enrollment:						
Total, all races and ethnicities	1,270,468	1,172,103	1,177,792	1,172,390	1,166,345	1,181,335
Nonresident aliens	23,772	18,823	23,003	23,752	24,289	23,668
White, non-Hispanic	1,015,889	927,506	884,406	862,443	851,473	852,116
Asian	23,901	38,421	53,634	57,359	58,617	61,681
Underrepresented minorities	206,906	187,354	216,749	228,836	231,966	243,870
Black, non-Hispanic	131,568	112,838	129,017	133,134	134,010	136,938
American Indian	6,895	6,148	7,719	8,122	8,495	8,966
Hispanic	68,443	68,368	80,013	87,580	89,461	97,966
Men, all races and ethnicities	613,280	559,513	553,667	548,308	544,887	551,691
Nonresident aliens	15,376	11,702	13,508	13,917	13,931	13,335
White, non-Hispanic	497,128	446,874	420,260	407,820	401,322	402,270
Asian	12,230	19,628	26,813	27,968	28,839	30,372
Underrepresented minorities	88,546	81,309	93,086	98,603	100,795	105,714
Black, non-Hispanic	55,515	47,695	53,828	55,988	56,836	58,035
American Indian	3,123	2,826	3,511	3,582	3,899	4,048
Hispanic	29,908	30,788	35,747	39,033	40,060	43,631
Women, all races and ethnicities	657,188	612,590	624,125	624,082	621,458	629,644
Nonresident aliens	8,396	7,121	9,495	9,835	10,358	10,333
White, non-Hispanic	518,760	480,632	464,146	454,623	450,151	449,846
Asian	11,671	18,792	26,821	29,391	29,778	31,309
Underrepresented minorities	118,360	106,044	123,663	130,233	131,171	138,156
Black, non-Hispanic	76,054	65,143	75,189	77,146	77,174	78,903
American Indian	3,772	3,322	4,208	4,540	4,596	4,918
Hispanic	38,535	37,580	44,266	48,547	49,401	54,335
Full-time first-time, first-year enrollment:						
Total, all races and ethnicities	1,131,679	1,065,293	1,068,073	1,055,780	1,064,621	1,077,803
Nonresident aliens	21,233	17,319	20,942	21,749	22,284	21,914
White, non-Hispanic	911,071	848,389	804,235	778,060	779,412	781,410
Asian	21,165	35,017	49,737	53,091	54,861	57,325
Underrepresented minorities	178,210	164,568	193,159	202,880	208,064	217,154
Black, non-Hispanic	112,970	99,513	115,895	118,987	120,063	122,071
American Indian	5,477	5,242	6,527	6,748	7,115	7,523
Hispanic	59,763	59,813	70,737	77,145	80,886	87,560
Men, all races and ethnicities	553,780	513,142	506,204	497,887	500,506	505,158
Nonresident aliens	13,961	10,853	12,340	12,762	12,811	12,384
White, non-Hispanic	452,014	412,618	385,900	371,519	370,188	370,815
Asian	10,842	17,864	24,895	25,880	26,931	28,134
Underrepresented minorities	76,963	71,806	83,069	87,726	90,576	93,825
Black, non-Hispanic	47,998	42,414	48,437	50,316	51,086	51,690
American Indian	2,598	2,434	3,024	3,026	3,308	3,442
Hispanic	26,367	26,958	31,608	34,384	36,182	38,693
Women, all races and ethnicities	577,899	552,151	561,869	557,893	564,115	572,645
Nonresident aliens	7,272	6,466	8,602	8,987	9,473	9,530
White, non-Hispanic	459,057	435,770	418,335	406,541	409,224	410,595
Asian	10,323	17,153	24,842	27,211	27,930	29,191
Underrepresented minorities	101,247	92,762	110,090	115,154	117,488	123,329
Black, non-Hispanic	64,971	57,098	67,458	68,671	68,977	70,381
American Indian	2,879	2,809	3,503	3,722	3,807	4,081
Hispanic	33,397	32,855	39,129	42,761	44,704	48,867

NOTES: Other/unknown races and ethnicities have been distributed proportionately across groups.
Because of rounding, details may not add to totals.

SOURCES: U.S. Department of Education/NCES. Opening Fall Enrollment Survey;
tabulations by National Science Foundation/SRS.

Appendix table 3-7. Selected characteristics of college freshmen, by sex and race/ethnicity: 1994

[Percent distribution]

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Student characteristic	All first-year students[1]							First-year students planning a science or engineering major		
	Men	Women	White	Black	Asian	American Indian	Hispanic	Total	Men	Women
Average high school grade:										
A or A+	11.5	17.1	19.1	7.6	25.0	16.2	15.1	23.8	22.4	25.3
A-	14.2	18.4	19.4	9.4	23.9	18.4	18.2	21.2	20.7	21.8
B+	18.1	21.8	21.1	18.7	20.3	19.2	21.2	20.3	19.9	20.8
B	24.8	24.2	22.8	24.0	19.1	24.2	24.4	19.6	20.1	19.1
B-	14.5	9.6	9.6	15.8	6.7	10.4	10.7	8.1	9.0	7.2
C+	10.8	6.3	5.8	16.1	3.4	7.5	6.7	4.8	5.4	4.2
C	5.8	2.5	2.2	8.0	1.6	3.7	3.6	2.0	2.5	1.5
D	0.3	0.1	0.0	0.4	0.1	0.3	0.1	0.1	0.1	0.0
Age:										
16 or younger	0	0.1	0.1	0.1	0.2	0.0	0.1	0.1	0.1	0.1
17	1.7	2.5	1.8	4.0	4.5	2.0	3.4	2.8	2.3	3.3
18	65.1	74.5	71.6	72.2	70.2	67.0	73.9	72.6	68.9	76.8
19	29.3	20.8	24.9	19.4	20.9	25.9	19.6	22.5	26.2	18.4
20	2.2	0.9	0.9	2.4	2.8	2.4	1.9	1.1	1.4	0.8
21 or older	1.5	1.1	0.8	1.9	1.4	2.7	1.1	0.9	1.1	0.6
Parental income:										
Less than $20,000	12.2	16.0	8.2	32.7	19.1	20.3	26.2	11.7	10.2	13.7
$20,000 to $49,999	35.8	37.5	33.3	38.0	30.4	40.3	39.8	32.8	32.4	33.3
$50,000 to $99,999	37.6	34.8	40.3	23.0	31.2	28.8	24.7	38.7	40.2	36.8
$100,000 or more	14.3	11.7	18.2	6.1	19.1	10.6	9.0	16.7	17.3	16.2
Received $1,500 or more from:										
Parents or relatives	NA	NA	67.7	40.3	67.8	46.8	47.4	64.1	63.9	64.2
Savings	NA	NA	19.6	5.1	10.2	11.6	8.0	17.5	19.5	15.3
Work	NA	NA	4.8	4.3	7.0	6.2	10.2	5.8	5.8	5.6
Grant	NA	NA	35.7	44.7	44.4	43.0	57.2	44.5	43.5	45.6
Loan	NA	NA	30.4	31.0	28.5	29.2	38.0	32.0	30.5	33.4
Other (includes spouse)	NA	NA	2.4	2.4	1.9	2.3	2.7	2.6	2.4	2.7
Highest degree planned:										
Bachelor's	27.9	24.1	26.2	17.6	13.1	21.3	18.1	15.6	18.6	12.1
Master's	39.3	41.5	40.0	37.7	35.7	36.8	38.8	35.7	37.5	33.7
Doctorate	16.6	16.8	16.1	22.5	21.5	22.3	21.7	26.6	24.9	28.7
Medical	8.3	9.8	10.1	11.5	22.7	10.7	12.4	13.3	11.3	15.5
Law	4.5	4.6	4.9	6.8	4.2	5.1	6.6	7.1	5.9	8.5
Other[2]	3.5	3.2	2.8	3.9	2.8	3.8	2.4	1.7	1.8	1.6

[1] Students could select more than one racial/ethnic category. Data by racial/ethnic group are not reliable for students whose intended major is a science or engineering field because of very small sample sizes.

[2] "Other" includes "none," "associate," and "divinity" degrees, and other degrees not listed.

KEY: NA = not available

NOTES: Includes first-year students at all U.S. 4-year colleges. Because of rounding, percentages may not add to 100.

SOURCE: Higher Education Research Institute, University of California at Los Angeles. 1994. *Survey of the American Freshman: National Norms.* Los Angeles: University of California. Unpublished tabulations. Also full report.

Appendix table 3-8. Parents' education of American college freshmen,[1] by race/ethnicity: 1984 and 1994

[Percent distribution]

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Parents' education	White		Black		Asian		American Indian		Hispanic	
	1984	1994	1984	1994	1984	1994	1984	1994	1984	1994
Father:										
Less than high school	9.5	4.7	26.8	13.0	13.4	11.9	21.5	11.0	38.3	31.5
High school graduate	24.0	21.8	32.7	32.8	12.6	12.9	30.5	24.8	21.9	19.5
Some college	14.2	15.6	13.4	19.3	10.2	10.5	15.7	19.9	13.1	14.9
College graduate	24.0	27.7	11.8	16.8	21.0	27.1	14.5	22.9	11.3	14.4
Some graduate school	3.0	3.0	1.4	1.5	3.7	3.2	1.2	2.3	1.5	2.1
Graduate degree	20.2	22.7	8.9	11.3	36.8	32.1	11.5	15.2	9.8	14.0
Postsecondary, not college	5.2	4.6	4.9	5.1	2.3	2.4	5.2	4.0	4.1	3.7
Mother:										
Less than high school	6.4	2.9	19.3	8.9	18.5	16.4	18.4	2.5	35.3	28.8
High school graduate	36.7	27.8	33.7	26.9	21.0	18.2	30.7	26.8	28.4	25.3
Some college	16.8	17.6	16.6	23.7	10.8	10.2	20.5	23.7	12.0	17.1
College graduate	21.0	26.8	13.2	19.2	23.4	31.0	12.1	21.6	12.6	13.8
Some graduate school	2.9	3.7	1.8	2.3	4.6	3.2	2.3	2.5	1.4	2.0
Graduate degree	8.5	14.1	8.6	12.6	16.8	17.4	8.4	11.2	5.4	8.1
Postsecondary, not college	7.7	7.1	6.8	6.4	5.0	3.6	7.6	5.5	4.9	5.0

[1] Students could select more than one racial/ethnic category. Data by racial/ethnic group are not reliable for students whose intended major is a science or engineering field because of very small sample sizes.

NOTES: Includes first-year students at all 4-year colleges. Because of rounding, percentages may not add to 100.

SOURCE: Higher Education Research Institute, University of California at Los Angeles. 1994. *Survey of the American Freshman: National Norms.* Los Angeles: University of California. Unpublished tabulations. Also full report.

Women, Minorities, and Persons With Disabilities in Science and Engineering: 1996

Appendix table 3-9. Freshmen, by sex, race/ethnicity, and number of years studying mathematics and science in high school: 1984 and 1994

[Percent distribution]

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Sex and race/ethnicity	Math (3 years)		Physical science (2 years)		Biological science (2 years)		Computer science (1/2 year)	
	1984	1994	1984	1994	1984	1994	1984	1994
Freshmen planning a science or engineering major:								
Total	95.1	98.4	66.6	61.5	35.8	43.7	62.7	58.5
Men	96.5	98.7	70.9	66.5	32.5	40.5	67.3	63.2
Women	93.1	98.0	60.1	55.9	40.8	47.3	55.7	53.3
All freshmen[1]:								
White	90.6	97.8	57.0	57.9	36.1	43.3	57.2	56.8
Black	82.8	96.0	46.3	34.7	34.2	32.6	42.9	53.1
Hispanic	85.9	97.4	49.3	47.2	28.8	35.9	47.1	57.0
Asian	96.8	98.7	69.2	62.1	39.8	44.3	60.0	54.8
American Indian	67.3	95.0	49.0	49.0	34.4	44.9	45.5	56.1

[1] Students could select more than one racial/ethnic category. Data by racial/ethnic group are not reliable for students whose intended major is a science or engineering field because of very small sample sizes.

NOTES: Includes first-year students at all 4-year colleges. Because of rounding, percentages may not add to 100.

SOURCE: Higher Education Research Institute, University of California at Los Angeles. 1994. *Survey of the American Freshman: National Norms.* Los Angeles: University of California. Unpublished tabulations.

Appendix table 3-10. Probable choice of major of American freshmen, by race/ethnicity and sex: 1984 and 1994

[Percent distribution]

Page 1 of 1

Race/ethnicity and sex	1984		1994	
	Science and engineering	Other	Science and engineering	Other
White	30.8	69.2	30.6	69.4
Men	39.5	60.5	36.0	64.0
Women	22.6	77.4	26.0	74.0
Asian	48.7	51.3	44.7	55.3
Men	60.1	39.9	52.6	47.4
Women	37.3	62.7	36.2	63.8
Black	28.3	71.7	34.7	65.3
Men	33.3	66.7	38.1	61.9
Women	24.9	75.1	32.6	67.4
Hispanic	32.9	67.1	38.2	61.8
Men	41.3	58.7	41.7	58.3
Women	25.8	74.2	35.4	64.6
American Indian	26.4	73.6	30.0	70.0
Men	31.8	68.2	33.9	66.1
Women	21.5	78.5	27.1	72.9

NOTES: Includes first-year students at all 4-year colleges. Because of rounding, percentages may not add to 100.

SOURCE: Higher Education Research Institute, University of California at Los Angeles. 1994. *Survey of the American Freshman: National Norms.* Los Angeles: University of California. Unpublished tabulations.

Appendix table 3-11. Career choices of American freshmen, by race/ethnicity and sex: 1984 and 1994

Page 1 of 1

Year and career choice	All freshmen[1]					Freshmen planning a science or engineering major		
	White	Black	Asian	American Indian	Hispanic	Total	Men	Women
1984:								
Business	16.4	21.5	12.0	16.7	14.6	3.1	3.5	2.8
Clinical psychologist	1.5	1.0	0.8	1.9	1.8	4.2	1.4	8.3
College teacher	0.3	0.3	0.4	0.4	0.4	0.4	0.3	0.4
Computer programmer	4.4	11.3	6.3	5.1	7.7	10.6	10.8	10.3
Doctor or dentist	5.7	6.8	21.3	6.0	8.6	7.7	7.6	8.3
Education (elementary or secondary)	6.2	3.2	1.5	7.4	4.1	1.4	0.9	3.0
Engineer	9.9	7.4	19.2	6.5	8.8	30.4	41.3	13.8
Lawyer	5.0	6.0	3.3	5.7	6.5	6.9	5.5	8.4
Nurse	3.5	5.2	2.5	3.4	3.5	0.2	0.0	0.6
Research scientist	1.8	0.7	2.8	1.9	1.4	5.4	5.0	5.7
Social worker	1.3	1.9	0.3	0.9	1.3	3.1	0.7	6.7
Undecided	12.3	6.6	9.2	9.8	9.5	8.7	5.9	12.1
Other	31.7	28.1	20.4	34.3	31.8	17.9	17.1	19.6
1994:								
Business	10.6	10.9	12.2	7.6	11.8	2.7	3.4	1.9
Clinical psychologist	1.9	2.3	1.1	2.7	2.4	5.8	2.0	9.9
College teacher	0.6	0.5	0.5	1.0	0.7	0.6	0.6	0.6
Computer programmer	2.2	4.7	3.8	2.3	2.5	5.2	7.5	2.6
Doctor or dentist	7.1	9.9	20.4	6.9	10.9	10.8	9.8	11.9
Education (elementary or secondary)	10.7	6.4	2.1	12.7	6.6	2.4	1.7	3.2
Engineer	6.6	9.7	13.5	5.8	10.1	23.4	34.7	10.8
Lawyer	4.7	8.1	4.4	5.0	7.3	7.8	6.3	9.5
Nurse	2.9	7.3	2.0	2.8	2.1	0.3	0.1	0.4
Research scientist	2.6	1.1	2.3	2.2	1.9	6.6	5.9	7.3
Social worker	1.3	2.1	0.5	1.1	1.6	3.5	0.8	6.5
Undecided	13.5	6.6	12.8	11.7	11.0	9.1	7.9	10.4
Other	35.3	30.4	24.4	38.2	31.1	21.8	19.3	25.0

[1] Data by racial/ethnic group are not reliable for students whose intended major is a science or engineering field because of very small sample sizes.

NOTES: Includes first-year students at all 4-year colleges. Because of rounding, percentages may not add to 100.

SOURCE: Higher Education Research Institute, University of California at Los Angeles. 1994. *Survey of the American Freshman: National Norms.* Los Angeles: University of California. Unpublished tabulations.

Appendix table 3-12. Freshmen planning a science or engineering major, by disability status and type of disability: 1994

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Disability status and type of disability	Percent
Disability status:	
Persons without disabilities	91.1
Persons with disabilities	8.9
Type of disability:	
Hearing	0.8
Speech	0.3
Orthopedic	0.8
Learning disability	1.7
Health-related	1.4
Partially sighted/blind	2.4
Other	1.5

NOTE: Includes first-year students at all 4-year colleges.

SOURCE: Higher Education Research Institute, University of California at Los Angeles. 1994. *Survey of the American Freshman: National Norms.* Los Angeles: University of California. Unpublished tabulations.

Women, Minorities, and Persons With Disabilities in Science and Engineering: 1996

Appendix table 3-13. Freshmen choice of college major, by disability status: 1994

[Percent distribution]

Page 1 of 1

Choice of major	Persons with disabilities	Persons without disabilities
Science and engineering	8.9	91.1
Physical sciences	9.9	90.1
Biological sciences	8.6	91.4
Social sciences	10.3	89.7
Engineering	7.6	92.4
Non-science and -engineering	9.5	90.5

NOTE: Includes first-year students at all 4-year colleges.

SOURCE: Higher Education Research Institute, University of California at Los Angeles. 1994. *Survey of the American Freshman: National Norms.* Los Angeles: University of California. Unpublished tabulations.

Appendix table 3-14. Type of disability reported among full-time college freshmen with disabilities: 1988–1994, selected years

[Percent distribution]

Page 1 of 1

Disability	1988	1991	1994
Learning	15.3	24.9	32.2
Partially sighted or blind	31.7	25.2	21.9
Other	18.5	18.3	18.8
Health-related	15.7	14.6	16.4
Orthopedic	13.8	13.5	10.2
Hearing	11.6	10.5	9.7
Speech	3.8	5.4	3.5

NOTE: Because of multiple disabilities, details may add to more than 100 percent.

SOURCE: Henderson, Cathy. 1995. *College Freshmen with Disabilities: A Triennial Statistical Profile.* Washington, DC: American Council on Education, HEATH Resource Center.

Women, Minorities, and Persons With Disabilities in Science and Engineering: 1996

Appendix table 3-15. Total and full-time enrollment at 2-year institutions, by sex and race/ethnicity: fall 1980–1993, selected years

Page 1 of 1

Enrollment status, sex, and race/ethnicity	1980	1986	1990	1991	1992	1993
Total enrollment:						
Total, all races and ethnicities	4,385,063	4,580,238	5,127,433	5,573,052	5,640,855	5,481,700
Nonresident aliens	62,598	50,610	74,872	73,677	90,571	91,597
White, non-Hispanic	3,442,016	3,492,939	3,862,883	4,125,559	4,056,303	3,881,434
Asian	123,952	184,311	215,612	258,334	292,533	298,701
Underrepresented minorities	756,497	852,378	974,066	1,115,482	1,201,448	1,209,968
Black, non-Hispanic	453,052	459,583	502,076	566,328	589,915	585,916
American Indian	44,762	47,295	51,674	59,223	60,329	60,468
Hispanic	258,684	345,500	420,316	489,931	551,204	563,584
Men, all races and ethnicities	1,986,366	2,016,770	2,187,839	2,371,839	2,380,322	2,313,508
Nonresident aliens	38,690	29,574	37,071	38,139	45,665	45,191
White, non-Hispanic	1,550,572	1,530,882	1,643,048	1,751,055	1,705,487	1,632,502
Asian	62,958	96,274	108,319	128,848	143,309	145,927
Underrepresented minorities	334,145	360,041	399,401	453,797	485,861	489,888
Black, non-Hispanic	190,411	181,069	191,202	213,179	218,387	217,300
American Indian	19,652	20,305	21,235	24,408	24,771	24,853
Hispanic	124,082	158,667	186,964	216,210	242,703	247,735
Women, all races and ethnicities	2,398,697	2,563,468	2,939,594	3,201,213	3,260,533	3,168,192
Nonresident aliens	23,908	21,037	37,801	35,538	44,906	46,406
White, non-Hispanic	1,891,443	1,962,057	2,219,835	2,374,504	2,350,816	2,248,932
Asian	60,994	88,037	107,293	129,486	149,224	152,774
Underrepresented minorities	422,352	492,337	574,665	661,685	715,587	720,080
Black, non-Hispanic	262,640	278,514	310,874	353,149	371,528	368,616
American Indian	25,109	26,990	30,439	34,815	35,558	35,615
Hispanic	134,602	186,833	233,352	273,721	308,501	315,849
Full-time enrollment:						
Total, all races and ethnicities	1,676,093	1,629,980	1,855,999	2,052,341	2,052,569	2,019,505
Nonresident aliens	38,354	28,923	39,211	39,633	45,565	48,067
White, non-Hispanic	1,258,520	1,188,709	1,366,075	1,479,651	1,449,464	1,399,762
Asian	45,720	66,254	75,885	92,216	102,279	108,173
Underrepresented minorities	333,499	346,094	374,828	440,841	455,261	463,503
Black, non-Hispanic	213,710	197,414	201,655	233,618	232,870	233,982
American Indian	17,043	17,621	19,985	24,160	24,983	25,341
Hispanic	102,745	131,059	153,188	183,063	197,408	204,180
Men, all races and ethnicities	843,863	791,556	869,853	953,362	940,000	920,419
Nonresident aliens	26,516	17,880	20,489	21,375	23,755	24,418
White, non-Hispanic	641,730	586,037	650,740	699,464	675,236	649,884
Asian	25,111	37,429	40,670	48,486	52,740	55,287
Underrepresented minorities	150,506	150,209	157,954	184,037	188,269	190,830
Black, non-Hispanic	92,933	82,117	81,822	93,616	90,702	90,977
American Indian	7,994	8,054	8,800	10,473	10,730	10,971
Hispanic	49,580	60,038	67,332	79,948	86,837	88,882
Women, all races and ethnicities	832,230	838,424	986,146	1,098,979	1,112,569	1,099,086
Nonresident aliens	11,838	11,043	18,722	18,258	21,810	23,649
White, non-Hispanic	616,791	602,672	715,335	780,187	774,228	749,878
Asian	20,609	28,825	35,215	43,730	49,539	52,886
Underrepresented minorities	182,992	195,884	216,874	256,804	266,992	272,673
Black, non-Hispanic	120,778	115,297	119,833	140,002	142,168	143,005
American Indian	9,049	9,567	11,185	13,687	14,253	14,370
Hispanic	53,165	71,021	85,856	103,115	110,571	115,298

NOTES: Other/unknown races and ethnicities have been distributed proportionately across groups. Because of rounding, details may not add to totals.

SOURCES: U.S. Department of Education/NCES. Opening Fall Enrollment Survey; tabulations by National Science Foundation/SRS.

Appendix table 3-16. Total and full-time enrollment of first-time, first-year students at 2-year institutions, by sex and race/ethnicity: fall 1980–1993, selected years

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Enrollment status, sex, and race/ethnicity	1980	1986	1990	1991	1992	1993
Total first-time, first-year enrollment:						
Total, all races and ethnicities	1,354,670	1,063,267	1,117,358	1,140,850	1,053,177	1,021,133
Nonresident aliens	18,028	12,138	16,392	17,997	17,725	18,155
White, non-Hispanic	1,054,864	815,214	831,475	829,024	748,636	708,998
Asian	32,572	36,724	43,464	46,662	49,953	54,542
Underrepresented minorities	249,206	199,191	226,027	247,167	236,863	239,438
Black, non-Hispanic	148,574	104,758	115,377	128,251	120,504	115,746
American Indian	14,895	12,099	13,237	14,752	13,227	12,841
Hispanic	85,737	82,335	97,413	104,164	103,132	110,851
Men, all races and ethnicities	620,166	492,164	507,478	534,604	482,778	473,546
Nonresident aliens	10,531	6,873	8,539	9,381	9,270	9,253
White, non-Hispanic	482,694	378,236	377,396	390,682	343,632	329,533
Asian	16,979	19,735	22,295	23,784	25,429	27,646
Underrepresented minorities	109,963	87,321	99,248	110,757	104,447	107,114
Black, non-Hispanic	62,929	43,968	48,826	56,466	51,106	49,855
American Indian	6,607	5,561	5,938	6,629	6,014	5,775
Hispanic	40,427	37,793	44,484	47,662	47,327	51,484
Women, all races and ethnicities	734,504	571,103	609,880	606,246	570,399	547,587
Nonresident aliens	7,497	5,265	7,853	8,616	8,455	8,902
White, non-Hispanic	572,170	436,978	454,079	438,342	405,004	379,465
Asian	15,593	16,989	21,169	22,878	24,524	26,896
Underrepresented minorities	139,243	111,870	126,779	136,410	132,416	132,324
Black, non-Hispanic	85,645	60,790	66,551	71,785	69,398	65,891
American Indian	8,288	6,538	7,299	8,123	7,213	7,066
Hispanic	45,310	44,542	52,929	56,502	55,805	59,367
Full-time first-time, first-year enrollment:						
Total, all races and ethnicities	650,881	536,623	583,607	628,267	571,868	567,342
Nonresident aliens	10,580	7,562	9,528	10,524	10,198	10,929
White, non-Hispanic	497,690	404,300	434,753	458,279	412,593	401,578
Asian	14,281	17,351	20,916	22,586	24,332	26,842
Underrepresented minorities	128,329	107,410	118,410	136,878	124,745	127,993
Black, non-Hispanic	81,604	59,963	64,303	76,424	66,767	65,935
American Indian	6,588	5,990	6,956	7,988	7,470	7,258
Hispanic	40,138	41,457	47,151	52,466	50,508	54,800
Men, all races and ethnicities	321,307	259,219	279,830	312,823	273,211	272,217
Nonresident aliens	6,840	4,469	5,167	5,713	5,466	5,718
White, non-Hispanic	249,893	198,385	211,280	232,854	200,183	195,953
Asian	7,732	9,726	11,138	11,786	12,600	13,786
Underrepresented minorities	56,841	46,639	52,245	62,470	54,962	56,760
Black, non-Hispanic	34,773	25,013	27,935	35,228	28,900	28,828
American Indian	3,175	2,870	3,238	3,740	3,483	3,362
Hispanic	18,893	18,756	21,072	23,502	22,579	24,570
Women, all races and ethnicities	329,574	277,404	303,777	315,444	298,657	295,125
Nonresident aliens	3,740	3,093	4,361	4,811	4,732	5,211
White, non-Hispanic	247,797	205,915	223,473	225,425	212,410	205,625
Asian	6,549	7,625	9,778	10,800	11,732	13,056
Underrepresented minorities	71,488	60,772	66,165	74,408	69,783	71,233
Black, non-Hispanic	46,831	34,950	36,368	41,196	37,867	37,107
American Indian	3,412	3,120	3,718	4,248	3,987	3,896
Hispanic	21,245	22,701	26,079	28,964	27,929	30,230

NOTES: Other/unknown races and ethnicities have been distributed proportionately across groups. Because of rounding, details may not add to totals.

SOURCES: U.S. Department of Education/NCES, Opening Fall Enrollment Survey; tabulations by National Science Foundation/SRS.

Women, Minorities, and Persons With Disabilities in Science and Engineering: 1996

Appendix table 3-17. 1991 and 1992 science and engineering bachelor's graduates who attended community college and the number who have associate's degrees, by sex, race/ethnicity, and disability status: 1993

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Sex, race/ethnicity, and disability status	Total graduates	Attended community college	Have associate's degree
Total science and engineering graduates	639,500	247,600	75,300
Sex:			
Men	354,900	134,500	42,200
Women	284,600	113,200	33,100
Race/ethnicity:			
White, non-Hispanic	514,700	194,600	60,300
Black, non-Hispanic	44,000	16,400	6,000
Hispanic	30,200	12,900	4,600
Asian	48,600	23,200	4,100
American Indian	2,000	600	300
Disability status:			
Persons with disabilities	70,700	30,900	11,000
Persons without disabilities	568,700	216,800	64,300

NOTE: Because of rounding, details may not add to totals.

SOURCE: National Science Foundation/SRS, National Survey of Recent College Graduates, 1993.

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Appendix table 3-18. Completion and enrollment status of first-time postsecondary students during the 1989–1990 academic year, by degree objective and selected student characteristics: spring 1992

[Percent distribution]

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Race/ethnicity and student characteristic	Degree objective						
	Associate's degree				Bachelor's degree		
	Completed	Continuously enrolled	Re-enrolled after interruption	No re-enrollment after interruption	Continuously enrolled	Re-enrolled after interruption	No re-enrollment after interruption
Total	12.3	19.1	22.5	46.1	56.8	18.9	24.2
Race/ethnicity[1] :							
White	12.8	18.5	21.6	47.2	57.6	17.9	24.5
Black	7.9	12.2	27.1	52.9	50.3	23.4	26.3
Hispanic	16.6	27.0	28.0	28.4	46.0	27.7	26.3
Time between high school graduation and entry into postsecondary education:							
12 months or less	16.6	23.5	22.0	37.9	59.5	18.0	22.5
More than 12 months	5.1	11.6	23.4	60.0	37.7	25.3	37.0
Type of postsecondary institution first enrolled in:							
4-year	6.5	26.6	18.9	48.0	61.6	16.1	22.3
2-year	13.1	18.3	22.7	45.9	43.1	27.5	29.4

[1] Included in the total, but not reported separately, are American Indian and Asian students.

NOTE: Because of rounding, percentages may not add to 100.

SOURCE: U.S. Department of Education/NCES, Beginning Postsecondary Student Longitudinal Survey, 1992.

Appendix table 3-19. Total and full-time lower-division enrollment at 4-year institutions, by sex and race/ethnicity: fall 1986–1993, selected years

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Enrollment status, sex, and race/ethnicity	1986	1988	1990	1991	1992	1993
Total lower-division undergraduate enrollment:						
Total, all races and ethnicities	3,407,894	3,570,240	3,623,689	3,598,646	3,567,291	3,511,794
Nonresident aliens	70,777	69,114	76,120	81,198	82,820	84,270
White, non-Hispanic	2,672,934	2,789,814	2,750,116	2,667,422	2,608,202	2,545,362
Asian	105,664	122,105	142,405	155,609	162,751	166,878
Underrepresented minorities	558,519	589,206	655,049	694,417	713,518	715,284
Black, non-Hispanic	334,590	354,953	389,273	407,563	417,757	414,884
American Indian	20,797	21,780	24,944	26,790	28,556	28,563
Hispanic	203,133	212,472	240,831	260,065	267,206	271,838
Men, all races and ethnicities	1,616,864	1,662,586	1,684,267	1,665,318	1,644,123	1,616,846
Nonresident aliens	45,251	41,905	44,705	47,549	47,929	47,920
White, non-Hispanic	1,278,839	1,312,083	1,293,490	1,249,048	1,215,078	1,184,933
Asian	54,544	62,379	72,066	77,454	80,475	82,214
Underrepresented minorities	238,230	246,219	274,007	291,267	300,641	301,779
Black, non-Hispanic	138,720	143,720	157,557	165,549	170,960	170,036
American Indian	9,246	9,259	10,599	11,368	12,334	12,275
Hispanic	90,264	93,241	105,850	114,349	117,347	119,467
Women, all races and ethnicities	1,791,030	1,907,653	1,939,422	1,933,328	1,923,167	1,894,948
Nonresident aliens	25,525	27,209	31,415	33,649	34,891	36,350
White, non-Hispanic	1,394,095	1,477,732	1,456,627	1,418,374	1,393,124	1,360,428
Asian	51,120	59,726	70,339	78,155	82,276	84,665
Underrepresented minorities	320,289	342,987	381,042	403,151	412,877	413,506
Black, non-Hispanic	195,870	211,233	231,716	242,013	246,796	244,847
American Indian	11,551	12,522	14,345	15,422	16,222	16,288
Hispanic	112,869	119,232	134,981	145,716	149,859	152,371
Full-time lower-division undergraduate enrollment:						
Total, all races and ethnicities	2,698,311	2,834,995	2,858,984	2,825,851	2,814,284	2,787,017
Nonresident aliens	61,704	59,865	65,694	70,732	72,251	72,832
White, non-Hispanic	2,112,111	2,208,587	2,158,070	2,078,326	2,041,511	2,011,317
Asian	88,116	103,647	121,318	132,252	139,193	142,352
Underrepresented minorities	436,380	462,897	513,902	544,541	561,329	560,515
Black, non-Hispanic	261,194	277,793	305,552	319,529	326,640	322,963
American Indian	15,108	16,092	18,189	19,102	20,337	20,535
Hispanic	160,078	169,013	190,161	205,909	214,352	217,017
Men, all races and ethnicities	1,325,578	1,364,129	1,375,147	1,353,241	1,340,669	1,322,665
Nonresident aliens	40,333	37,097	39,305	42,198	42,456	42,223
White, non-Hispanic	1,049,423	1,076,288	1,054,165	1,011,343	987,583	968,535
Asian	45,785	53,270	61,816	66,171	69,289	70,645
Underrepresented minorities	190,037	197,475	219,862	233,529	241,341	241,262
Black, non-Hispanic	111,580	115,761	127,476	134,030	137,601	136,420
American Indian	6,901	7,149	8,223	8,522	9,148	9,301
Hispanic	71,556	74,564	84,162	90,977	94,592	95,541
Women, all races and ethnicities	1,372,733	1,470,866	1,483,837	1,472,610	1,473,615	1,464,352
Nonresident aliens	21,372	22,768	26,390	28,534	29,795	30,610
White, non-Hispanic	1,062,688	1,132,299	1,103,905	1,066,983	1,053,927	1,042,782
Asian	42,331	50,377	59,502	66,082	69,905	71,707
Underrepresented minorities	246,343	265,422	294,040	311,011	319,988	319,253
Black, non-Hispanic	149,614	162,031	178,076	185,499	189,039	186,543
American Indian	8,207	8,943	9,966	10,580	11,189	11,234
Hispanic	88,522	94,448	105,998	114,932	119,760	121,476

NOTES: Other/unknown races and ethnicities have been distributed proportionately across groups. Because of rounding, details may not add to totals.

SOURCES: U.S. Department of Education/NCES, Opening Fall Enrollment Survey; tabulations by National Science Foundation/SRS.

Appendix table 3-20. Total and full-time upper-division enrollment at 4-year institutions, by sex and race/ethnicity: fall 1986–1993, selected years

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Enrollment status, sex, and race/ethnicity	1986	1988	1990	1991	1992	1993
Total upper-division undergraduate enrollment:						
Total, all races and ethnicities	2,964,035	3,058,101	3,260,535	3,423,636	3,485,632	3,489,319
Nonresident aliens	81,701	77,377	76,345	80,330	85,270	93,174
White, non-Hispanic	2,402,249	2,483,110	2,619,091	2,715,546	2,723,721	2,676,842
Asian	101,575	114,721	133,117	151,223	165,179	177,006
Underrepresented minorities	378,510	382,892	431,981	476,538	511,462	542,297
Black, non-Hispanic	206,791	212,465	234,242	257,361	275,060	289,847
American Indian	15,007	15,927	18,517	19,826	21,994	23,679
Hispanic	156,712	154,500	179,223	199,350	214,407	228,770
Men, all races and ethnicities	1,445,134	1,456,075	1,524,451	1,595,533	1,619,668	1,616,772
Nonresident aliens	54,537	50,042	47,499	47,942	50,046	53,801
White, non-Hispanic	1,173,759	1,184,470	1,229,324	1,273,207	1,275,161	1,250,505
Asian	54,805	60,535	69,902	78,371	84,780	90,084
Underrepresented minorities	162,033	161,028	177,725	196,013	209,681	222,382
Black, non-Hispanic	84,590	85,129	91,450	99,920	106,776	112,270
American Indian	6,816	6,937	7,858	8,410	9,467	10,098
Hispanic	70,627	68,961	78,418	87,684	93,438	100,015
Women, all races and ethnicities	1,518,901	1,602,027	1,736,084	1,828,104	1,865,965	1,872,547
Nonresident aliens	27,164	27,335	28,846	32,388	35,224	39,373
White, non-Hispanic	1,228,490	1,298,641	1,389,766	1,442,339	1,448,560	1,426,338
Asian	46,770	54,187	63,215	72,852	80,399	86,921
Underrepresented minorities	216,477	221,864	254,256	280,524	301,781	319,914
Black, non-Hispanic	122,201	127,336	142,792	157,442	168,285	177,578
American Indian	8,191	8,990	10,659	11,416	12,527	13,581
Hispanic	86,086	85,539	100,805	111,666	120,969	128,755
Full-time upper-division undergraduate enrollment:						
Total, all races and ethnicities	2,126,760	2,188,976	2,343,882	2,468,068	2,502,370	2,496,330
Nonresident aliens	67,000	63,496	62,323	66,328	71,069	75,817
White, non-Hispanic	1,722,270	1,771,364	1,879,657	1,952,036	1,946,057	1,902,352
Asian	75,713	86,703	100,867	114,999	126,137	136,203
Underrepresented minorities	261,777	267,412	301,035	334,705	359,107	381,959
Black, non-Hispanic	145,497	149,225	163,685	180,655	193,679	205,099
American Indian	10,169	10,773	12,595	14,077	15,622	16,821
Hispanic	106,112	107,414	124,755	139,974	149,806	160,039
Men, all races and ethnicities	1,067,991	1,071,573	1,122,828	1,177,701	1,192,741	1,187,414
Nonresident aliens	45,466	41,639	39,249	40,033	42,228	44,637
White, non-Hispanic	867,167	869,039	904,223	937,771	935,433	913,387
Asian	41,217	45,876	52,891	59,823	65,011	69,597
Underrepresented minorities	114,141	115,019	126,464	140,074	150,069	159,793
Black, non-Hispanic	61,417	61,478	65,951	72,285	77,300	81,886
American Indian	4,749	4,794	5,471	6,086	6,907	7,411
Hispanic	47,976	48,747	55,043	61,703	65,862	70,496
Women, all races and ethnicities	1,058,769	1,117,403	1,221,054	1,290,367	1,309,629	1,308,916
Nonresident aliens	21,534	21,857	23,073	26,295	28,841	31,179
White, non-Hispanic	855,103	902,325	975,434	1,014,265	1,010,625	988,965
Asian	34,496	40,828	47,976	55,175	61,125	66,606
Underrepresented minorities	147,636	152,393	174,571	194,632	209,038	222,166
Black, non-Hispanic	84,080	87,747	97,734	108,370	116,379	123,213
American Indian	5,420	5,979	7,124	7,991	8,715	9,410
Hispanic	58,136	58,667	69,713	78,271	83,944	89,543

NOTES: Other/unknown races and ethnicities have been distributed proportionately across groups. Because of rounding, details may not add to totals.

SOURCES: U.S. Department of Education/NCES. Opening Fall Enrollment Survey; tabulations by National Science Foundation/SRS.

Appendix table 3-21. Baccalaureate-origin institutions of 1989–1993 female science and engineering (S&E) doctorate recipients, ranked according to total science and engineering doctorates

Page 1 of 1

Academic institution	Total S&E	Total science	Physical sciences	Math-ematics	Computer sciences	Agric. sciences	Biological sciences	Psychology	Social sciences	Engineering
Calif, U-Berkeley	441	401	46	13	0	13	130	101	98	40
Cornell Univ/NY	372	346	41	3	4	26	136	88	48	26
Michigan, Univ of	360	322	32	2	1	3	82	143	59	38
Ill. U, Urbana-Champaign	337	298	36	7	5	20	106	81	43	39
Calif, U-Los Angeles	304	296	29	3	4	0	67	154	39	8
Wisconsin, U-Madison	297	283	21	5	4	24	86	89	54	14
Penn State Univ	277	248	16	2	3	25	101	54	47	29
Calif, U-Davis	242	235	27	1	2	23	125	35	22	7
Maryland, Univ of	214	204	18	4	1	11	65	73	32	10
Rutgers Univ/NJ	213	196	30	4	3	10	65	63	21	17
Michigan State Univ	213	200	13	0	3	16	74	56	38	13
Pennsylvania, U of	206	192	13	3	3	1	53	73	46	14
Ohio State Univ	196	177	15	3	3	15	46	55	40	19
Minnesota, U-Minneapolis	196	183	18	3	1	19	51	44	47	13
Mass Inst Technology	187	119	35	3	10	0	57	4	10	68
Texas, U-Austin	176	164	13	5	3	3	40	68	32	12
Brown University/RI	174	165	18	2	3	0	42	68	32	9
Stanford Univ/CA	173	158	21	0	1	1	44	55	36	15
Harvard Univ/MA	169	163	25	6	9	4	49	30	40	6
Calif, U-San Diego	160	150	15	7	0	1	53	46	28	10
Colorado, U-Boulder	156	144	15	3	5	2	41	48	30	12
Washington, U of	153	138	11	1	2	5	40	42	37	15
SUNY at Buffalo	152	139	18	3	0	1	27	60	30	13
Purdue University/IN	151	118	19	0	5	16	37	26	15	33
Calif, U-Santa Barbara	151	145	13	3	4	1	42	52	30	6
Yale University/CT	147	142	15	5	2	0	40	39	41	5
Wellesley College/MA	144	139	20	1	1	1	38	47	31	5
Duke University/NC	144	136	25	0	6	3	41	48	13	8
Florida, Univ of	142	133	11	3	1	11	28	56	23	9
Smith College/MA	141	139	19	2	2	3	43	40	30	2
Mass. U of-Amherst	139	132	9	1	0	5	49	43	25	7
Columbia-Barnard/NY	139	137	10	0	2	1	26	63	35	2
Boston University/MA	135	135	8	1	3	0	31	69	23	0
Princeton Univ/NJ	133	118	23	5	4	0	42	22	22	15
Indiana U Bloomington	133	131	14	0	3	1	32	44	37	2
Delaware, Univ of	133	122	22	1	1	8	40	25	25	11
NC, U of-Chapel Hill	132	131	23	2	2	2	34	46	22	1
PR, U-Rio Piedras	131	126	30	3	1	3	25	32	32	5
SUNY at Binghamton	129	128	8	1	5	0	31	67	16	1
Virginia, Univ of	129	115	10	0	3	2	34	45	21	14
Texas A&M University	127	113	17	0	1	13	50	25	7	14
Calif, U-Irvine	126	124	11	4	3	1	30	55	20	2
Mt Holyoke Coll/MA	123	122	25	5	0	1	40	34	17	1
SUNY at Albany	122	120	7	1	4	2	33	47	26	2
New York University	121	121	8	3	1	0	24	68	17	0
Oberlin College/OH	120	118	13	5	1	0	29	40	30	2
Iowa State Univ	120	109	13	1	2	21	36	21	15	11
SUNY at Stony Brook	119	116	12	4	0	2	31	53	14	3
Calif, U-Santa Cruz	118	115	13	1	1	0	38	30	32	3
Rochester, Univ of/NY	115	103	11	1	0	0	34	45	12	12

SOURCE: National Science Foundation/SRS, Survey of Earned Doctorates.

Appendix table 3-22. Bachelor's degrees conferred by Historically Black Colleges and Universities (HBCUs) to blacks, by field: 1985–1993, selected years

Page 1 of 1

Field	1985	1987	1989	1990	1991	1992	1993
Black recipients from HBCUs:							
Total science and engineering	4,933	5,229	5,054	5,190	5,679	6,363	7,368
Sciences	4,495	4,672	4,580	4,666	5,090	5,769	6,668
Natural sciences	2,369	2,750	2,513	2,353	2,363	2,599	3,021
Physical science[1]	363	346	320	296	358	376	390
Mathematical science	382	425	381	307	369	420	463
Computer science	740	1,187	1,048	899	748	780	904
Biological science	783	714	693	764	792	906	1,155
Agricultural science	101	78	71	87	96	117	109
Social sciences	2,126	1,922	2,067	2,313	2,727	3,170	3,647
Social science	1,581	1,457	1,517	1,651	1,886	2,201	2,507
Psychology	545	465	550	662	841	969	1,140
Engineering	438	557	474	524	589	594	700
Non-science and -engineering	11,808	10,853	10,435	10,744	11,910	12,899	14,073
Grand total	16,741	16,082	15,489	15,934	17,589	19,262	21,441
Degrees from HBCUs as a percentage of total awarded to blacks:							
Total science and engineering	28.9	30.3	29.1	28.5	28.4	28.4	30.2
Sciences	30.0	31.3	29.9	28.9	28.7	28.7	30.5
Natural sciences	39.4	42.2	41.8	40.7	40.5	40.6	43.3
Physical science	43.7	42.0	45.9	45.5	47.5	46.1	46.7
Mathematical science	49.6	51.0	48.1	42.6	45.5	46.5	48.0
Computer science	34.5	42.1	42.7	40.0	37.5	37.3	40.8
Biological science	38.3	37.8	36.2	38.3	37.5	38.0	42.2
Agricultural science	46.1	49.7	49.7	50.9	59.3	56.8	49.8
Social sciences	23.6	22.9	22.2	22.3	22.9	23.2	24.5
Social science	25.0	24.5	23.1	22.8	22.9	23.2	24.4
Psychology	20.4	19.0	20.1	21.0	22.8	23.2	24.7
Engineering	21.5	24.1	22.9	25.3	26.4	25.1	27.2
Non-science and -engineering	30.1	29.6	27.3	26.9	27.2	27.1	27.5
Grand total	29.7	29.9	27.8	27.4	27.6	27.5	28.4

[1] "Physical science" includes earth, atmospheric, and ocean sciences, as well as physics, astronomy, and chemistry.

NOTES: Data on race/ethnicity were collected biennially from 1977 through 1989 and annually thereafter. Data on race/ethnicity of degree recipients are collected on broad fields of study only; therefore, these data could not be adjusted to the exact field taxonomies used by NSF. Racial/ethnic categories as designated on the survey form. These categories include U.S. citizens and foreign citizens on permanent visas (i.e., resident aliens who have been admitted for permanent residency).

SOURCES: Tabulations by National Science Foundation/SRS, data from Center for Education Statistics; biennial data from the HEGIS Earned Degrees Surveys, 1985, and IPEDS Completions Surveys, 1987–93.

Women Minorities, and Persons With Disabilities in Science and Engineering: 1996

Appendix table 3-23. Associate's degrees in science and engineering, by sex, field, race/ethnicity, and citizenship status: 1985 and 1993

Page 1 of 2

Year, sex, and field	Total	White, non-Hispanic	Asian	Black, non-Hispanic	Hispanic	American Indian	Unknown race/ ethnicity	Non-resident alien[1]
1985								
Total science and engineering[2]	78,700	59,998	2,418	5,109	3,531	436	5,903	1,305
Physical science	1,065	734	51	48	60	8	144	20
Mathematics	789	525	63	24	38	4	96	39
Computer science	12,890	9,730	448	914	638	52	834	274
Agricultural science	2,393	2,138	4	19	53	29	116	34
Biological science	1,233	676	31	93	135	8	270	20
Psychology	983	680	8	65	43	11	162	14
Social science	2,681	1,390	39	342	287	40	524	59
Science technology	1,164	931	20	61	67	6	70	9
Engineering technology	51,579	40,934	1,570	3,395	2,084	267	2,649	680
Engineering	3,923	2,260	184	148	126	11	1,038	156
Women:								
Total science and engineering[2]	17,011	12,353	540	1,358	892	135	1,462	271
Physical science	360	251	22	21	22	3	36	5
Mathematics	300	204	29	7	9	0	36	15
Computer science	6,251	4,663	236	462	311	36	417	126
Agricultural science	912	832	1	8	9	8	49	5
Biological science	679	370	18	56	93	4	130	8
Psychology	671	476	7	43	33	9	94	9
Social science	1,537	794	15	201	156	30	309	32
Science technology	466	366	10	31	18	4	34	3
Engineering technology	5,413	4,146	185	500	217	40	268	57
Engineering	422	251	17	29	24	1	89	11
Men:								
Total science and engineering[2]	61,689	47,645	1,878	3,751	2,639	301	4,441	1,034
Physical science	705	483	29	27	38	5	108	15
Mathematics	489	321	34	17	29	4	60	24
Computer science	6,639	5,067	212	452	327	16	417	148
Agricultural science	1,481	1,306	3	11	44	21	67	29
Biological science	554	306	13	37	42	4	140	12
Psychology	312	204	1	22	10	2	68	5
Social science	1,144	596	24	141	131	10	215	27
Science technology	698	565	10	30	49	2	36	6
Engineering technology	46,166	36,788	1,385	2,895	1,867	227	2,381	623
Engineering	3,501	2,009	167	119	102	10	949	145

See explanatory information and SOURCES at end of table.

Appendix table 3-23. Associate's degrees in science and engineering, by sex, field, race/ethnicity, and citizenship status: 1985 and 1993

Page 2 of 2

Year, sex, and field	Total	White, non-Hispanic	Asian	Black, non-Hispanic	Hispanic	American Indian	Unknown race/ethnicity	Non-resident alien[1]
1993								
Total science and engineering[2]	62,496	44,717	2,504	4,724	4,647	529	4,347	1,028
Physical science	1,392	995	76	70	52	7	125	67
Mathematics	743	509	69	26	67	15	10	47
Computer science	9,512	6,006	459	978	1,019	101	712	237
Agricultural science	2,227	2,017	6	15	88	41	27	33
Biological science	1,471	977	146	93	160	25	32	38
Psychology	1,237	894	33	109	141	18	25	17
Social science	4,011	2,347	183	471	472	100	318	120
Science technology	905	644	38	63	97	4	48	11
Engineering technology	38,473	28,442	1,358	2,698	2,398	210	2,987	380
Engineering	2,525	1,886	136	201	153	8	63	78
Women:								
Total science and engineering[2]	15,638	10,556	661	1,596	1,493	223	759	350
Physical science	599	427	43	46	28	3	22	30
Mathematics	315	218	24	16	28	3	4	22
Computer science	4,830	3,040	232	605	543	69	237	104
Agricultural science	651	570	2	4	37	13	16	9
Biological science	871	578	75	63	91	18	22	24
Psychology	955	700	26	76	104	12	21	16
Social science	2,305	1,404	112	243	303	69	102	72
Science technology	381	255	18	31	50	2	17	8
Engineering technology	4,401	3,133	117	484	266	33	310	58
Engineering	330	231	12	28	43	1	8	7
Men:								
Total science and engineering[2]	46,858	34,161	1,843	3,128	3,154	306	3,588	678
Physical science	793	568	33	24	24	4	103	37
Mathematics	428	291	45	10	39	12	6	25
Computer science	4,682	2,966	227	373	476	32	475	133
Agricultural science	1,576	1,447	4	11	51	28	11	24
Biological science	600	399	71	30	69	7	10	14
Psychology	282	194	7	33	37	6	4	1
Social science	1,706	943	71	228	169	31	216	48
Science technology	524	389	20	32	47	2	31	3
Engineering technology	34,072	25,309	1,241	2,214	2,132	177	2,677	322
Engineering	2,195	1,655	124	173	110	7	55	71

[1] Nonresident aliens include foreign citizens on temporary visas only. No racial/ethnic data are collected for this group.

[2] Includes degrees in science technology and engineering technology.

SOURCES: U.S. Department of Education/NCES. IPEDS Completions Survey, 1993; tabulations by National Science Foundation/SRS.

Women, Minorities, and Persons With Disabilities in Science and Engineering: 1996

Appendix table 3-24. Bachelor's degrees in science and engineering and all other fields, by sex: 1966–1993

Page 1 of 1

Year	Total, all fields			Science and engineering			All other fields		
	Men	Women	Percent women	Men	Women	Percent women	Men	Women	Percent women
1966	301,037	222,971	42.6	138,679	45,634	24.8	162,358	177,337	52.2
1967	324,236	238,133	42.3	149,045	50,787	25.4	175,191	187,346	51.7
1968	359,747	277,116	43.5	165,200	61,397	27.1	194,547	215,719	52.6
1969	412,865	321,138	43.8	189,272	72,917	27.8	223,593	248,221	52.6
1970	453,605	344,465	43.2	204,528	79,702	28.0	249,077	264,763	51.5
1971	478,423	367,687	43.5	209,318	85,039	28.9	269,105	282,648	51.2
1972	503,631	390,479	43.7	216,422	90,037	29.4	287,209	300,442	51.1
1973	521,534	408,738	43.9	225,090	95,995	29.9	296,444	312,743	51.3
1974	530,907	423,469	44.4	223,652	102,578	31.4	307,255	320,891	51.1
1975	508,424	423,239	45.4	210,741	102,814	32.8	297,683	320,425	51.8
1976	508,549	425,894	45.6	205,570	103,921	33.6	302,979	321,973	51.5
1977	499,121	429,107	46.2	198,805	104,993	34.6	300,316	324,114	51.9
1978	491,066	439,135	47.2	195,888	107,667	35.5	295,178	331,468	52.9
1979	481,394	449,946	48.3	193,247	109,915	36.3	288,147	340,031	54.1
1980	477,750	462,501	49.2	191,215	113,480	37.2	286,535	349,021	54.9
1981	474,336	472,541	49.9	190,977	115,815	37.8	283,359	356,725	55.7
1982	477,543	486,500	50.5	193,624	121,399	38.5	283,919	365,101	56.3
1983	483,395	497,284	50.7	194,538	123,337	38.8	288,857	373,947	56.4
1984	486,750	499,595	50.7	199,262	125,221	38.6	287,488	374,374	56.6
1985	486,660	504,217	50.9	203,464	128,958	38.8	283,196	375,259	57.0
1986	490,143	510,061	51.0	204,771	130,689	39.0	285,372	379,372	57.1
1987	485,003	518,529	51.7	199,981	131,545	39.7	285,022	386,984	57.6
1988	481,236	524,797	52.2	191,549	130,933	40.6	289,687	393,864	57.6
1989	487,566	542,605	52.7	189,338	133,483	41.3	298,228	409,122	57.8
1990	495,867	566,284	53.3	189,082	140,012	42.5	306,785	426,272	58.1
1991	508,952	599,045	54.1	189,328	148,347	43.9	319,624	450,698	58.5
1992	525,395	624,677	54.3	195,779	159,486	44.9	329,616	465,191	58.5
1993	537,536	641,742	54.4	200,315	165,720	45.3	337,221	476,022	58.5

SOURCES: U.S. Department of Education/NCES. HEGIS Earned Degrees Surveys through 1985; IPEDS Completions Surveys, 1986–93; tabulations by National Science Foundation/SRS.

Appendix table 3-25. Bachelor's degrees, by sex and major field group: 1983–1993

Page 1 of 1

		Science and engineering fields								
Year and sex	All fields	Total	Engineering	Physical sciences	Earth, atmos, and ocean sciences	Mathematical/ computer sciences	Biological/ agricultural	Psychology	Social sciences	All other fields
Total:										
1983	980,679	317,571	72,670	16,197	7,298	37,344	55,411	40,825	87,826	663,108
1984	986,345	324,284	76,153	15,831	7,925	45,946	52,351	40,375	85,703	662,061
1985	990,877	332,273	77,572	16.270	7,576	54,510	51,312	40,237	84,796	658,604
1986	1,000,204	335,405	76,820	15,784	6,076	58,726	50,441	40,937	86,621	664,799
1987	1,003,532	331,526	74,425	15,464	4,689	56,442	48,571	43,195	88,740	672,006
1988	1,006,033	322,482	70,154	14,255	3,554	50,877	46,925	45,378	91,339	683,551
1989	1,030,171	322,821	66,947	14,148	3,181	46,277	45,531	48,954	97,783	707,350
1990	1,062,151	329,094	64.705	13,425	2,776	42,369	46,451	54,018	105,350	733,057
1991	1,107,997	337,675	62.187	13,678	2,728	40,194	48,783	58,893	111,212	770,322
1992	1,150,072	355,265	61,941	13,875	3,201	39,889	54,193	64,033	118,133	794,807
1993	1,179,278	366,035	62,705	14,188	3,503	39,433	59,621	67,251	119,334	813,243
Men:										
1983	483,395	194,380	63,018	11,586	5,450	22,802	31,132	13,228	47,164	289,015
1984	486,750	199,150	65,424	11,175	5,991	27,893	29,108	12,949	46,610	287,600
1985	486,660	203,402	66,326	11,434	5,715	32,985	28,172	12,815	45,955	283,258
1986	490,143	204,743	65,682	11,088	4,722	35,920	27,488	12,691	47,152	285,400
1987	485,003	199,981	63,021	10,792	3,629	34,871	26,168	13,399	48,101	285,022
1988	481,236	191,549	59,375	9,673	2,707	32,112	24,550	13,584	49,548	289,687
1989	487,566	189,338	56,759	9,777	2,380	29,682	23.852	14,291	52,597	298,228
1990	495,867	189,082	54,732	9,106	2,001	27,184	24,050	15,399	56,610	306,785
1991	508,952	189,328	52,522	9,253	1,946	25,700	25,007	16,155	58,745	319,624
1992	525,395	195,779	52,305	9,289	2,177	25,693	27,473	17,130	61,712	329,616
1993	537,536	200,315	52,724	9,424	2,453	25,483	30,439	18,029	61,763	337,221
Women:										
1983	497,284	123,191	9,652	4,611	1,848	14,542	24,279	27,597	40,662	374,093
1984	499,595	125,134	10,729	4,656	1,934	18,053	23,243	27,426	39,093	374,461
1985	504,217	128,871	11,246	4,836	1,861	21,525	23,140	27,422	38,841	375,346
1986	510,061	130,662	11,138	4,696	1,354	22,806	22,953	28,246	39,469	379,399
1987	518,529	131,545	11,404	4,672	1,060	21,571	22,403	29,796	40,639	386,984
1988	524,797	130,933	10,779	4,582	847	18,765	22,375	31,794	41,791	393,864
1989	542,605	133,483	10,188	4,371	801	16,595	21,679	34,663	45,186	409,122
1990	566,284	140,012	9,973	4,319	775	15,185	22,401	38,619	48,740	426,272
1991	599,045	148,347	9,665	4,425	782	14,494	23,776	42,738	52,467	450,698
1992	624,677	159,486	9,636	4,586	1,024	14,196	26,720	46.903	56,421	465,191
1993	641.742	165,720	9,981	4,764	1,050	13,950	29,182	49,222	57,571	476,022
Percent women:										
1983	50.7	38.8	13.3	28.5	25.3	38.9	43.8	67.6	46.3	56.4
1984	50.7	38.6	14.1	29.4	24.4	39.3	44.4	67.9	45.6	56.6
1985	50.9	38.8	14.5	29.7	24.6	39.5	45.1	68.2	45.8	57.0
1986	51.0	39.0	14.5	29.8	22.3	38.8	45.5	69.0	45.6	57.1
1987	51.7	39.7	15.3	30.2	22.6	38.2	46.1	69.0	45.8	57.6
1988	52.2	40.6	15.4	32.1	23.8	36.9	47.7	70.1	45.8	57.6
1989	52.7	41.3	15.2	30.9	25.2	35.9	47.6	70.8	46.2	57.8
1990	53.3	42.5	15.4	32.2	27.9	35.8	48.2	71.5	46.3	58.1
1991	54.1	43.9	15.5	32.4	28.7	36.1	48.7	72.6	47.2	58.5
1992	54.3	44.9	15.6	33.1	32.0	35.6	49.3	73.2	47.8	58.5
1993	54.4	45.3	15.9	33.6	30.0	35.4	48.9	73.2	48.2	58.5

SOURCES: Tabulations by National Science Foundation/SRS; data from U.S. Department of Education/NCES: Survey of Degrees and Other Formal Awards Conferred, and Completions Survey.

Appendix table 3-26. Bachelor's degrees in science and engineering, by detailed field and sex: 1983 and 1993

Page 1 of 1

Field	1983				1993			
	Total	Men	Women	Percent women	Total	Men	Women	Percent women
Total science and engineering	317,571	194.380	123,191	38.8	366,035	200,315	165,720	45.3
Physical sciences	16,197	11,586	4,611	28.5	14,188	9,424	4,764	33.6
Astronomy	96	72	24	25.0	167	120	47	28.1
Chemistry	11.039	7,303	3,736	33.8	9,109	5,365	3,744	41.1
Physics	3,800	3,317	483	12.7	4,080	3,403	677	16.6
Other	1,262	894	368	29.2	832	536	296	35.6
Earth, atmospheric, and ocean sciences	7,298	5,450	1,848	25.3	3,503	2,453	1,050	30.0
Atmospheric sciences	396	330	66	16.7	369	305	64	17.3
Geosciences	6,774	5,007	1,767	26.1	2,901	1,978	923	31.8
Oceanography	128	113	15	11.7	233	170	63	27.0
Mathematics/computer sciences	37,344	22,802	14,542	38.9	39,433	25,483	13,950	35.4
Mathematical sciences	12,662	7,112	5,550	43.8	14,853	7,854	6,999	47.1
Computer sciences	24,682	15,690	8,992	36.4	24,580	17,629	6,951	28.3
Biological/agricultural sciences	55,411	31,132	24,279	43.8	59,621	30,439	29,182	48.9
Agricultural sciences	14,528	9,206	5,322	36.6	11,632	7,294	4,338	37.3
Biological sciences	40,883	21,926	18,957	46.4	47,989	23,145	24,844	51.8
Psychology	40,825	13,228	27,597	67.6	67,251	18,029	49,222	73.2
Social sciences	87,826	47,164	40,662	46.3	119,334	61,763	57,571	48.2
Economics	22,410	15,163	7,247	32.3	22,973	16,161	6,812	29.7
Political science	31,871	18,679	13,192	41.4	47,936	26,701	21,235	44.3
Sociology	14,347	4,363	9,984	69.6	21,007	6,638	14,369	68.4
Other	19,198	8,959	10,239	53.3	27,418	12,263	15,155	55.3
Engineering	72,670	63,018	9,652	13.3	62,705	52,724	9,981	15.9
Aero/astro engineering	2,127	1,955	172	8.1	2,735	2,419	316	11.6
Chemical engineering	8,550	6,761	1,789	20.9	4,899	3,335	1,564	31.9
Civil engineering	10,747	9,263	1,484	13.8	9,788	8,009	1,779	18.2
Electrical engineering	19.205	17,283	1,922	10.0	19,598	17,339	2,259	11.5
Industrial engineering	3,824	2,824	1,000	26.2	3,584	2,547	1,037	28.9
Mechanical engineering	16,031	14,546	1,485	9.3	14.708	13,076	1,632	11.1
Materials/metal engineering	1,392	1,104	288	20.7	1,216	956	260	21.4
Other	10.794	9,282	1,512	14.0	6,177	5,043	1,134	18.4

SOURCES: Tabulations by National Science Foundation/SRS; data from U.S. Department of Education/NCES, IPEDS Completion Surveys.

Appendix table 3-27. Bachelor's degrees awarded to U.S. citizens and permanent residents, by race/ethnicity of recipient and field: 1985–1993, selected years

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Race/ethnicity and field	1985	1987	1989	1990	1991	1992	1993
U.S. citizens and permanent residents, total:							
Total science and engineering	325,172	319,963	317,950	323,081	335,424	356,632	366,357
Sciences	255,263	252,803	256,989	264,846	279,089	300,064	309,383
Natural sciences	123,764	117,081	102,668	98,066	98,666	104,351	109,435
Physical science	22,892	19,027	16,482	15,237	15,483	16,104	16,567
Mathematical science	14,212	15,506	14,524	13,817	13,898	14,012	14,074
Computer science	36,692	35,943	27,721	24,478	22,651	22,268	21,790
Biological science	38,047	37,294	35,462	36,302	38,374	41,951	45,785
Agricultural science	11,921	9,311	8,479	8,232	8,260	10,016	11,219
Social sciences	131,499	135,722	154,321	166,780	180,423	195,713	199,948
Social science	92,093	94,474	107,137	115,248	123,735	133,760	135,107
Psychology	39,406	41,248	47,184	51,532	56,688	61,953	64,841
Engineering	69,909	67,160	60,961	58,235	56,335	56,568	56,974
Non-science and -engineering	624,946	628,600	662,114	679,009	717,186	740,885	755,919
Grand total	950,118	948,563	980,064	1,002,090	1,052,610	1,097,517	1,122,276
White, non-Hispanic:							
Total science and engineering	281,394	272,090	266,862	270,225	278,190	292,614	297,171
Sciences	220,402	215,599	216,781	222,731	233,028	247,588	252,318
Natural sciences	107,076	98,344	84,578	80,210	80,111	84,133	87,401
Physical science	20,541	16,653	14,238	13,055	13,145	13,678	13,941
Mathematical science	12,163	13,265	12,287	11,765	11,649	11,723	11,669
Computer science	31,321	29,181	21,711	18,918	17,349	16,844	16,155
Biological science	31,818	30,549	28,404	28,814	30,264	32,506	35,080
Agricultural science	11,233	8,696	7,938	7,658	7,704	9,382	10,556
Social sciences	113,326	117,255	132,203	142,521	152,917	163,455	164,917
Social science	79,367	81,494	91,697	98,385	104,783	111,389	111,154
Psychology	33,959	35,761	40,506	44,136	48,134	52,066	53,763
Engineering	60,992	56,491	50,081	47,494	45,162	45,026	44,853
Non-science and -engineering	544,962	547,387	573,464	586,461	614,173	628,839	634,432
Grand total	826,356	819,477	840,326	856,686	892,363	921,453	931,603
Asian:							
Total science and engineering	13,323	16,934	19,138	19,437	20,552	22,635	24,504
Sciences	8,841	11,344	13,063	13,425	14,332	16,370	18,097
Natural sciences	5,809	7,130	7,260	7,326	7,595	8,496	9,524
Physical science	763	894	922	937	983	1,001	1,098
Mathematical science	885	1,034	1,019	874	915	857	915
Computer science	2,044	2,455	2,268	2,144	2,010	2,082	2,245
Biological science	1,952	2,565	2,907	3,245	3,559	4,402	5,103
Agricultural science	165	182	144	126	128	154	163
Social sciences	3,032	4,214	5,803	6,099	6,737	7,874	8,573
Social science	2,187	3,060	4,228	4,469	4,852	5,724	6,035
Psychology	845	1,154	1,575	1,630	1,885	2,150	2,538
Engineering	4,482	5,590	6,075	6,012	6,220	6,265	6,407
Non-science and -engineering	12,239	14,987	18,435	18,590	21,173	23,981	26,083
Grand total	25,562	31,921	37,573	38,027	41,725	46,616	50,587

See explanatory information and SOURCES at end of table.

Appendix table 3-27. Bachelor's degrees awarded to U.S. citizens and permanent residents, by race/ethnicity of recipient and field: 1985–1993, selected years

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Race/ethnicity and field	1985	1987	1989	1990	1991	1992	1993
Black, non-Hispanic:							
Total science and engineering	17,040	17,230	17,385	18,230	19,987	22,431	24,421
Sciences	15,001	14,915	15,318	16,158	17,758	20,069	21,844
Natural sciences	6,009	6,524	6,005	5,782	5,834	6,401	6,972
Physical science	830	823	697	650	753	816	836
Mathematical science	770	834	792	720	811	904	965
Computer science	2,143	2,820	2,457	2,247	1,997	2,090	2,213
Biological science	2,047	1,890	1,916	1,994	2,111	2,385	2,739
Agricultural science	219	157	143	171	162	206	219
Social sciences	8,992	8,391	9,313	10,376	11,924	13,668	14,872
Social science	6,325	5,940	6,570	7,226	8,236	9,489	10,254
Psychology	2,667	2,451	2,743	3,150	3,688	4,179	4,618
Engineering	2,039	2,315	2,067	2,072	2,229	2,362	2,577
Non-science and -engineering	40,523	37,873	39,452	41,071	45,022	48,880	52,246
Grand total	57,563	55,103	56,837	59,301	65,009	71,311	76,667
Hispanic:							
Total science and engineering	12,031	12,419	13,327	13,918	15,351	17,391	18,442
Sciences	9,844	9,865	10,766	11,407	12,785	14,658	15,481
Natural sciences	4,359	4,660	4,417	4,357	4,705	4,892	5,034
Physical science	660	585	563	522	533	546	599
Mathematical science	335	321	373	413	480	482	470
Computer science	1,045	1,375	1,195	1,085	1,215	1,173	1,096
Biological science	2,069	2,146	2,090	2,119	2,264	2,477	2,652
Agricultural science	250	233	196	218	213	214	217
Social sciences	5,485	5,205	6,349	7,050	8,080	9,766	10,447
Social science	3,751	3,503	4,197	4,645	5,334	6,519	6,860
Psychology	1,734	1,702	2,152	2,405	2,746	3,247	3,587
Engineering	2,187	2,554	2,561	2,511	2,566	2,733	2,961
Non-science and -engineering	24,360	25,777	28,034	29,946	33,676	35,616	39,403
Grand total	36,391	38,196	41,361	43,864	49,027	53,007	57,845
American Indian:							
Total science and engineering	1,384	1,290	1,238	1,271	1,344	1,561	1,819
Sciences	1,175	1,080	1,061	1,125	1,186	1,379	1,643
Natural sciences	511	423	408	391	421	429	504
Physical science	98	72	62	73	69	63	93
Mathematical science	59	52	53	45	43	46	55
Computer science	139	112	90	84	80	79	81
Biological science	161	144	145	130	176	181	211
Agricultural science	54	43	58	59	53	60	64
Social sciences	664	657	653	734	765	950	1,139
Social science	463	477	445	523	530	639	804
Psychology	201	180	208	211	235	311	335
Engineering	209	210	177	146	158	182	176
Non-science and -engineering	2,862	2,576	2,729	2,941	3,142	3,569	3,755
Grand total	4,246	3,866	3,967	4,212	4,486	5,130	5,574

NOTES: Data on race/ethnicity were collected biennially from 1977 through 1989 and annually thereafter. Data on race/ethnicity of degree recipients are collected on broad fields of study only; therefore, these data could not be adjusted to the exact taxonomies used by NSF. Racial/ethnic categories as designated on the survey form. These categories include U.S. citizens and foreign citizens on permanent visas (i.e., resident aliens who have been admitted for permanent residency).

SOURCES: Tabulations by National Science Foundation/SRS: data from U.S. Department of Education/NCES biennial data from the HEGIS Earned Degrees Surveys, 1985, and IPEDS Completions Surveys, 1987–93.

Appendix table 3-28. Bachelor's degrees awarded to U.S. citizens and permanent residents, by sex of recipient, field, and race/ethnicity: 1993

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Sex and field	Total	White, non-Hispanic	Asian	Black, non-Hispanic	Hispanic	American Indian
Both sexes:						
Total science and engineering	366,357	297,171	24,504	24,421	18,442	1,819
Sciences	309,383	252,318	18,097	21,844	15,481	1,643
Natural sciences	109,435	87,401	9,524	6,972	5,034	504
Physical science	16,567	13,941	1,098	836	599	93
Mathematical science	14,074	11,669	915	965	470	55
Computer science	21,790	16,155	2,245	2,213	1,096	81
Biological science	45,785	35,080	5,103	2,739	2,652	211
Agricultural science	11,219	10,556	163	219	217	64
Social sciences	199,948	164,917	8,573	14,872	10,447	1,139
Social science	135,107	111,154	6,035	10,254	6,860	804
Psychology	64,841	53,763	2,538	4,618	3,587	335
Engineering	56,974	44,853	6,407	2,577	2,961	176
Non-science and -engineering	755,919	634,432	26,083	52,246	39,403	3,755
Grand total	1,122,276	931,603	50,587	76,667	57,845	5,574
Men:						
Total science and engineering	200,355	166,063	14,132	10,099	9,160	901
Sciences	152,720	127,819	9,002	8,335	6,805	759
Natural sciences	63,194	52,048	5,380	2,872	2,608	286
Physical science	11,081	9,614	675	370	361	61
Mathematical science	7,377	6,131	502	444	273	27
Computer science	15,623	12,329	1,492	1,049	700	53
Biological science	22,056	17,293	2,633	883	1,144	103
Agricultural science	7,057	6,681	78	126	130	42
Social sciences	89,526	75,771	3,622	5,463	4,197	473
Social science	72,166	61,269	2,884	4,364	3,269	380
Psychology	17,360	14,502	738	1,099	928	93
Engineering	47,635	38,244	5,130	1,764	2,355	142
Non-science and -engineering	306,304	261,177	10,687	18,275	14,665	1,500
Grand total	506,659	427,240	24,819	28,374	23,825	2,401
Women:						
Total science and engineering	166,002	131,108	10,372	14,322	9,282	918
Sciences	156,663	124,499	9,095	13,509	8,676	884
Natural sciences	46,241	35,353	4,144	4,100	2,426	218
Physical science	5,486	4,327	423	466	238	32
Mathematical science	6,697	5,538	413	521	197	28
Computer science	6,167	3,826	753	1,164	396	28
Biological science	23,729	17,787	2,470	1,856	1,508	108
Agricultural science	4,162	3,875	85	93	87	22
Social sciences	110,422	89,146	4,951	9,409	6,250	666
Social science	62,941	49,885	3,151	5,890	3,591	424
Psychology	47,481	39,261	1,800	3,519	2,659	242
Engineering	9,339	6,609	1,277	813	606	34
Non-science and -engineering	449,615	373,255	15,396	33,971	24,738	2,255
Grand total	615,617	504,363	25,768	48,293	34,020	3,173

NOTES: Data on race/ethnicity were collected biennially from 1977 through 1989 and annually thereafter. Data on race/ethnicity of degree recipients are collected on broad fields of study only; therefore, these data could not be adjusted to the exact field taxonomies used by NSF. Racial/ethnic categories as designated on the survey form. These categories include U.S. citizens and foreign citizens on permanent visas (i.e., resident aliens who have been admitted for permanent residency).

SOURCES: Tabulations by National Science Foundation/SRS; data from U.S. Department of Education/NCES biennial data from the HEGIS Earned Degrees Surveys, 1985, and IPEDS Completions Surveys, 1987–93.

Appendix table 4-1. Doctorates in science and engineering, by field, primary source of support in graduate school, and sex: 1993

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Field and primary source of support	Total		Men		Women	
	Number	Percent	Number	Percent	Number	Percent
Total, all fields	39,754	100.0	24,646	100.0	15,108	100.0
Teaching assistantship	4,618	11.6	2,929	11.9	1,689	11.2
Research assistantship	7,037	17.7	5,276	21.4	1,761	11.7
Other	14,605	36.7	8,022	32.5	6,583	43.6
Unknown	13,494	33.9	8,419	34.2	5,075	33.6
Total science and engineering	25,184	100.0	17,647	100.0	7,537	100.0
Teaching assistantship	3,059	12.1	2,108	11.9	951	12.6
Research assistantship	6,438	25.6	4,962	28.1	1,476	19.6
Other	7,363	29.2	4,722	26.8	2,641	35.0
Unknown	8,324	33.1	5,855	33.2	2,469	32.8
Physical sciences	4,472	100.0	3,529	100.0	943	100.0
Teaching assistantship	627	14.0	484	13.7	143	15.2
Research assistantship	1,661	37.1	1,333	37.8	328	34.8
Other	684	15.3	533	15.1	151	16.0
Unknown	1,500	33.5	1,179	33.4	321	34.0
Mathematical and computer sciences	2,024	100.0	1,623	100.0	401	100.0
Teaching assistantship	628	31.0	483	29.8	145	36.2
Research assistantship	326	16.1	272	16.8	54	13.5
Other	459	22.7	364	22.4	95	23.7
Unknown	611	30.2	504	31.1	107	26.7
Agricultural sciences	969	100.0	741	100.0	228	100.0
Teaching assistantship	28	2.9	19	2.6	9	3.9
Research assistantship	317	32.7	239	32.3	78	34.2
Other	312	32.2	239	32.3	73	32.0
Unknown	312	32.2	244	32.9	68	29.8
Biological sciences	5,090	100.0	3,040	100.0	2,050	100.0
Teaching assistantship	486	9.5	268	8.8	218	10.6
Research assistantship	1,350	26.5	803	26.4	547	26.7
Other	1,607	31.6	951	31.3	656	32.0
Unknown	1,647	32.4	1,018	33.5	629	30.7
Psychology	3,419	100.0	1,330	100.0	2,089	100.0
Teaching assistantship	343	10.0	136	10.2	207	9.9
Research assistantship	273	8.0	110	8.3	163	7.8
Other	1,621	47.4	610	45.9	1,011	48.4
Unknown	1,182	34.6	474	35.6	708	33.9
Social sciences	3,514	100.0	2,209	100.0	1,305	100.0
Teaching assistantship	541	15.4	354	16.0	187	14.3
Research assistantship	300	8.5	195	8.8	105	8.0
Other	1,302	37.1	790	35.8	512	39.2
Unknown	1,371	39.0	870	39.4	501	38.4
Engineering	5,696	100.0	5,175	100.0	521	100.0
Teaching assistantship	406	7.1	364	7.0	42	8.1
Research assistantship	2,211	38.8	2,010	38.8	201	38.6
Other	1,378	24.2	1,235	23.9	143	27.4
Unknown	1,701	29.9	1,566	30.3	135	25.9
Non-science and -engineering	14,570	100.0	6,999	100.0	7,571	100.0
Teaching assistantship	1,559	10.7	821	11.7	738	9.7
Research assistantship	599	4.1	314	4.5	285	3.8
Other	7,242	49.7	3,300	47.1	3,942	52.1
Unknown	5,170	35.5	2,564	36.6	2,606	34.4

NOTES: An analysis of the validity of responses to the question on source of support revealed that the "teaching assistantship" and "research assistantship" responses are likely to be accurate, but that other responses, such as "USDA Fellowship" or "Rockefeller Foundation Fellowship" are likely to be invalid because the respondents could accurately identify the type, but not the source, of financial support. Therefore, these responses, which in many cases are the majority of responses, are aggregated as "other." Data differ slightly from other doctoral degree totals because field classifications could not be adjusted to the exact field taxonomies used in other tables. Because of rounding, details may not add to totals.

SOURCE: National Science Foundation/SRS. Survey of Earned Doctorates.

Appendix table 4-2. Doctorates in science and engineering awarded to U.S. citizens, by field, primary source of support in graduate school, and race/ethnicity: 1993

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Field and primary source of support	Total	Black	American Indian	Asian	Hispanic	White	Other/unknown
Total, all fields	26,386	1,106	119	891	834	23,202	234
Teaching assistantship	2,772	49	7	71	76	2,548	21
Research assistantship	3,747	49	7	240	79	3,350	22
Other	11,914	578	63	303	355	10,557	58
Unknown	7,953	430	42	277	324	6,747	133
Total science and engineering	14,708	363	41	710	439	13,011	144
Teaching assistantship	1,610	21	4	57	40	1,473	15
Research assistantship	3,379	34	6	229	76	3,012	22
Other	5,506	152	16	215	175	4,918	30
Unknown	4,213	156	15	209	148	3,608	77
Physical sciences	2,555	31	9	127	75	2,285	28
Teaching assistantship	345	3	1	10	11	315	5
Research assistantship	1,016	7	1	59	18	923	8
Other	550	10	3	21	17	497	2
Unknown	644	11	4	37	29	550	13
Mathematical and computer sciences	920	10	2	55	14	824	15
Teaching assistantship	233	3	1	16	3	208	2
Research assistantship	159	0	0	8	3	147	1
Other	300	4	0	12	4	276	4
Unknown	228	3	1	19	4	193	8
Agricultural sciences	457	5	1	9	14	425	3
Teaching assistantship	15	1	0	0	1	13	0
Research assistantship	163	1	0	3	1	157	1
Other	135	1	0	2	5	126	1
Unknown	144	2	1	4	7	129	1
Biological sciences	3,445	63	7	190	93	3,053	39
Teaching assistantship	314	4	0	12	9	286	3
Research assistantship	797	4	3	48	24	713	5
Other	1,322	32	3	71	29	1,180	7
Unknown	1,012	23	1	59	31	874	24
Psychology	3,066	117	15	52	120	2,746	16
Teaching assistantship	305	6	1	5	6	287	0
Research assistantship	254	12	1	7	7	227	0
Other	1,528	53	7	23	67	1,375	3
Unknown	979	46	6	17	40	857	13
Social sciences	2,040	96	5	59	67	1,790	23
Teaching assistantship	294	3	0	4	8	274	5
Research assistantship	145	5	1	4	4	129	2
Other	875	31	2	26	27	783	6
Unknown	726	57	2	25	28	604	10
Engineering	2,225	41	2	218	56	1,888	20
Teaching assistantship	104	1	1	10	2	90	0
Research assistantship	845	5	0	100	19	716	5
Other	796	21	1	60	26	681	7
Unknown	480	14	0	48	9	401	8
Non-science and -engineering	11,678	743	78	181	395	10,191	90
Teaching assistantship	1,162	28	3	14	36	1,075	6
Research assistantship	368	15	1	11	3	338	0
Other	6,408	426	47	88	180	5,639	28
Unknown	3,740	274	27	68	176	3,139	56

NOTES: An analysis of the validity of responses to the question on source of support revealed that the "teaching assistantship" and "research assistantship" responses are likely to be accurate, but that other responses, such as "USDA Fellowship" or "Rockefeller Foundation Fellowship" are likely to be invalid because the respondents could accurately identify the type, but not the source, of financial support. Therefore, these responses, which in many cases are the majority of responses, are aggregated as "other." Data differ slightly from other doctoral degree totals because field classifications could not be adjusted to the exact field taxonomies used in other tables.

SOURCE: National Science Foundation/SRS. Survey of Earned Doctorates.

Appendix table 4-3. Doctorates in science and engineering, by field, primary source of support in graduate school, and disability status: 1993

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Field and primary source of support	Total		With disabilities		Without disabilities	
	Number	Percent	Number	Percent	Number	Percent
Total, all fields	39,754	100.0	632	100.0	36,515	100.0
Teaching assistantship	4,618	11.6	58	9.2	4,508	12.3
Research assistantship	7,037	17.7	85	13.4	6,859	18.8
Other	14,605	36.7	288	45.6	14,130	38.7
Unknown	13,494	33.9	201	31.8	11,018	30.2
Total science and engineering	25,184	100.0	329	100.0	23,266	100.0
Teaching assistantship	3,059	12.1	33	10.0	2,992	12.9
Research assistantship	6,438	25.6	74	22.5	6,284	27.0
Other	7,363	29.2	120	36.5	7,148	30.7
Unknown	8,324	33.1	102	31.0	6,842	29.4
Physical sciences	4,472	100.0	51	100.0	4,175	100.0
Teaching assistantship	627	14.0	8	15.7	616	14.8
Research assistantship	1,661	37.1	20	39.2	1,625	38.9
Other	684	15.3	7	13.7	671	16.1
Unknown	1,500	33.5	16	31.4	1,263	30.3
Mathematical and computer sciences	2,024	100.0	19	100.0	1,873	100.0
Teaching assistantship	628	31.0	6	31.6	617	32.9
Research assistantship	326	16.1	4	21.1	316	16.9
Other	459	22.7	4	21.1	449	24.0
Unknown	611	30.2	5	26.3	491	26.2
Agricultural sciences	969	100.0	11	100.0	911	100.0
Teaching assistantship	28	2.9	0	0.0	28	3.1
Research assistantship	317	32.7	2	18.2	310	34.0
Other	312	32.2	5	45.5	302	33.2
Unknown	312	32.2	4	36.4	271	29.7
Biological sciences	5,090	100.0	67	100.0	4,760	100.0
Teaching assistantship	486	9.5	5	7.5	468	9.8
Research assistantship	1,350	26.5	22	32.8	1,313	27.6
Other	1,607	31.6	18	26.9	1,568	32.9
Unknown	1,647	32.4	22	32.8	1,411	29.6
Psychology	3,419	100.0	71	100.0	3,056	100.0
Teaching assistantship	343	10.0	4	5.6	336	11.0
Research assistantship	273	8.0	2	2.8	267	8.7
Other	1,621	47.4	45	63.4	1,552	50.8
Unknown	1,182	34.6	20	28.2	901	29.5
Social sciences	3,514	100.0	65	100.0	3,216	100.0
Teaching assistantship	541	15.4	6	9.2	529	16.4
Research assistantship	300	8.5	6	9.2	288	9.0
Other	1,302	37.1	27	41.5	1,255	39.0
Unknown	1,371	39.0	26	40.0	1,144	35.6
Engineering	5,696	100.0	45	100.0	5,275	100.0
Teaching assistantship	406	7.1	4	8.9	398	7.5
Research assistantship	2,211	38.8	18	40.0	2,165	41.0
Other	1,378	24.2	14	31.1	1,351	25.6
Unknown	1,701	29.9	9	20.0	1,361	25.8
Non-science and -engineering	14,570	100.0	303	100.0	13,249	100.0
Teaching assistantship	1,559	10.7	25	8.3	1,516	11.4
Research assistantship	599	4.1	11	3.6	575	4.3
Other	7,242	49.7	168	55.4	6,982	52.7
Unknown	5,170	35.5	99	32.7	4,176	31.5

NOTES: An analysis of the validity of responses to the question on source of support revealed that the "teaching assistantship" and "research assistantship" responses are likely to be accurate, but that other responses, such as "USDA Fellowship" or "Rockefeller Foundation Fellowship" are likely to be invalid because the respondents could accurately identify the type, but not the source, of financial support. Therefore, these responses, which in many cases are the majority of responses, are aggregated as "other." Data differ slightly from other doctoral degree totals because field classifications could not be adjusted to the exact field taxonomies used in other tables. Because of rounding, percentages may not add to 100.

SOURCE: National Science Foundation/SRS. Survey of Earned Doctorates.

Appendix table 4-4. Selected characteristics of graduate students, by disability status: 1992–1993

[Percent distribution]

Page 1 of 1

Student characteristics and field	Students without disabilities	Students with disabilities
Total	96.0	4.0
Characteristics		
Attendance pattern:		
Full-time/full year: 1 institution	97.0	3.0
Full-time/full year: more than 1 institution	87.9	12.1
Full-time/part year	94.5	5.5
Part-time/full year: 1 institution	96.0	4.0
Part-time/full year: more than 1 institution	94.2	5.8
Part-time/part year	95.7	4.3
Received any financial aid in 1992–1993:		
No	96.0	4.1
Yes	96.1	3.9
Received any need-based aid in 1992–1993:		
No	96.0	4.0
Yes	96.1	3.9
Major field of study		
Total science and engineering	96.1	3.9
Agricultural sciences	94.4	5.6
Computer science and mathematics	95.9	4.1
Biological sciences	96.2	3.8
Physical sciences	95.1	4.9
Social sciences	96.0	4.0
Engineering	97.1	2.9
Non-science and -engineering	96.0	4.0

NOTE: Because of rounding, percentages may not add to 100.

SOURCE: U.S. Department of Education/NCES. 1992–93 National Postsecondary Student Aid Study. Table generation system.

Appendix 4-5. Median years between bachelor's and doctoral degrees, by field and sex: 1993

Page 1 of 1

Field	Total		Men		Women	
	Registered	Total	Registered	Total	Registered	Total
Total, all fields	7.12	10.52	6.91	9.93	7.50	12.20
Total science and engineering	6.72	9.07	6.63	9.00	6.97	9.24
Physics and astronomy	6.73	7.84	6.68	7.76	7.04	8.38
Chemistry	5.81	7.18	5.90	7.32	5.56	6.85
Earth, atmos & ocean sciences	7.47	10.32	7.36	10.45	7.79	9.91
Mathematics	6.68	8.54	6.66	8.58	6.76	8.42
Computer/information sciences	6.98	9.48	6.81	9.34	7.87	11.19
Agricultural sciences	6.57	10.65	6.54	10.71	6.73	10.50
Biological sciences	6.75	8.55	6.78	8.56	6.71	8.54
Psychology	7.19	9.95	7.13	9.87	7.23	10.02
Social sciences	7.72	10.91	7.55	10.53	8.06	11.73
Engineering	6.27	8.83	6.26	8.92	6.38	8.03
Non-science and -engineering	8.05	15.65	7.91	14.16	8.17	16.99

SOURCE: National Science Foundation/SRS. Survey of Earned Doctorates.

Appendix table 4-6. Female science and engineering graduate students in all institutions, by field: 1988–1993

Page 1 of 2

Field	1988	1989	1990	1991	1992	1993
Total science and engineering	121,429	126,264	134,222	141,359	150,684	157,493
Sciences	108,280	112,636	119,532	125,624	133,429	139,758
Physical sciences	7,497	7,801	8,080	8,580	8,856	9,216
Astronomy	140	140	165	172	186	198
Chemistry	5,467	5,670	5,868	6,262	6,562	6,854
Physics	1,751	1,868	1,925	1,993	1,955	1,988
Physical sciences, n.e.c.	139	123	122	153	153	176
Earth, atmospheric, and ocean sciences	3,824	3,868	4,133	4,474	4,887	5,092
Atmospheric sciences	163	178	185	190	241	225
Geosciences	2,095	1,963	1,922	2,008	2,077	2,112
Oceanography	645	725	781	846	959	1,016
Earth, atmospheric, and ocean sciences, n.e.c.	921	1,002	1,245	1,430	1,610	1,739
Mathematical sciences	5,781	5,990	6,205	6,303	6,553	6,698
Computer sciences	8,194	7,988	8,222	8,274	8,428	8,421
Agricultural sciences	3,100	3,148	3.327	3,563	3,767	4,081
Biological sciences	21,267	22,239	23,054	24,150	25,495	27,076
Anatomy	458	480	458	501	493	493
Biochemistry	1,996	2,018	2,065	2,131	2,218	2,340
Biology	5,454	5,752	5,949	6,217	6,587	6,842
Biometry/epidemiology	914	984	997	1,112	1,331	1,530
Biophysics	149	162	164	182	202	226
Botany	1,122	1,090	1,085	1,076	1,062	1,110
Cell biology	845	944	1,120	1,281	1,406	1,582
Ecology	397	440	469	518	589	664
Entomology/parasitology	359	364	358	341	354	400
Genetics	629	690	727	759	842	932
Microbiology, immunology, and virology	2,157	2,239	2,320	2,352	2,366	2,459
Nutrition	2,941	2,967	2,941	2,916	2,947	3,095
Pathology	554	579	586	638	661	759
Pharmacology	847	969	1,024	1,130	1,186	1,245
Physiology	863	893	933	966	951	983
Zoology	784	792	835	884	828	860
Biological sciences, n.e.c.	798	876	1,023	1,146	1,472	1,556
Psychology	28,541	30,155	32,691	35,185	37,150	38,392
Social sciences	30,076	31,447	33,820	35,095	38,293	40,782
Agricultural economics	546	582	599	636	712	748
Anthropology (cultural and social)	3,446	3,580	3,791	3,953	4,247	4,402
Economics (except agricultural)	3,098	3.240	3,372	3,557	3,800	3,870
Geography	1,055	1,184	1,204	1,318	1,431	1,582
Linguistics	1,947	1,952	2,006	1,913	1,996	2,059
Political science	11,422	12,191	13 194	13,757	15,021	16,003
Sociology	3,839	3,997	4,290	4,615	5,144	5,558
Sociology/anthropology	548	568	697	514	569	563
Social sciences. n.e.c.	4,175	4,153	4.667	4,832	5,373	5.997

See explanatory information and SOURCE at end of table.

Appendix table 4-6. Female science and engineering graduate students in all institutions, by field: 1988–1993

Page 2 of 2

Field	1988	1989	1990	1991	1992	1993
Engineering	13,149	13,628	14,690	15,735	17,255	17,735
Aerospace engineering	227	243	289	327	348	358
Agricultural engineering	86	87	101	126	144	151
Biomedical engineering	442	474	547	588	617	696
Chemical engineering	1,075	1,029	1,146	1,257	1,394	1,496
Civil engineering	2,294	2,435	2,689	3,102	3,652	3,895
Electrical engineering	3,278	3,515	3,715	3,871	4,298	4,321
Engineering science	267	248	299	288	305	305
Industrial eng./management science	2,088	2,106	2,132	2,350	2,651	2,597
Mechanical engineering	1,412	1,398	1,442	1,511	1,698	1,774
Metallurgical/materials engineering	756	810	897	991	1,074	1,026
Nuclear engineering	127	141	155	177	186	185
Engineering, n.e.c.	1,097	1,142	1,278	1,147	888	931

KEY: n.e.c. = Not elsewhere classified

SOURCE: National Science Foundation/SRS, Survey of Graduate Students and Postdoctorates in Science and Engineering, 1993.

Appendix table 4-7. Male science and engineering graduate students in all institutions, by field: 1988–1993

Page 1 of 2

Field	1988	1989	1990	1991	1992	1993
Total science and engineering	254,150	256,963	263,644	272,200	280,760	280,559
Sciences	164,355	166,547	170,712	174.293	179,898	181,188
Physical sciences	25,465	25,815	26,050	26.216	26,559	26,179
Astronomy	591	649	645	657	683	682
Chemistry	13,112	13,158	13.250	13,145	13.367	13.288
Physics	11,557	11,789	11,943	12,146	12,233	11,919
Physical sciences, n.e.c.	205	219	212	268	276	290
Earth, atmospheric, and ocean sciences	10,081	9,800	9,891	10,058	10,526	10,799
Atmospheric sciences	777	734	744	778	848	887
Geosciences	6,368	6,089	5,770	5,559	5,667	5,672
Oceanography	1,388	1,482	1,552	1,540	1,571	1,637
Earth, atmospheric, and ocean sciences, n.e.c.	1,548	1,495	1,825	2,181	2,440	2,603
Mathematical sciences	13,315	13,294	13,589	13,667	13,814	13,466
Computer sciences	24,033	24,494	26,149	26,424	27,905	27,926
Agricultural sciences	8,028	8,044	7,974	7,940	8,053	7,862
Biological sciences	26,318	26,633	26,963	27,662	28,736	29,464
Anatomy	598	598	542	550	537	534
Biochemistry	2,925	3,064	2,974	3,070	3,158	3,188
Biology	6,939	7,009	7,078	7,084	7,303	7,553
Biometry/epidemiology	768	738	874	920	1,037	1,135
Biophysics	443	493	478	515	549	554
Botany	1,814	1,754	1,676	1,646	1,656	1,632
Cell biology	1,233	1,290	1,435	1,528	1,687	1,809
Ecology	602	644	667	662	712	746
Entomology/parasitology	881	817	815	830	839	847
Genetics	660	675	681	761	797	853
Microbiology, immunology, and virology	2,616	2,588	2,553	2,576	2,606	2,594
Nutrition	1,191	1,197	1,231	1,236	1,203	1,225
Pathology	789	803	784	837	826	858
Pharmacology	1,277	1,298	1,329	1,302	1,352	1,410
Physiology	1,357	1,313	1,303	1,366	1,366	1,389
Zoology	1,245	1,291	1,269	1,307	1,311	1,260
Biological sciences, n.e.c.	980	1,061	1,274	1,472	1,797	1,877
Psychology	15,543	15,796	15,963	16,694	16,767	16,827
Social sciences	41,572	42,671	44,133	45,632	47,538	48,665
Agricultural economics	1,713	1,694	1,674	1.728	1.810	1,667
Anthropology (cultural and social)	2,499	2,548	2.688	2,778	2,876	2,976
Economics (except agricultural)	8,927	8,887	8,940	9,138	9,439	9,444
Geography	2,153	2,295	2,326	2,442	2,671	2,796
Linguistics	1,296	1,334	1.398	1,512	1,281	1,328
Political science	16,359	17,017	17,430	17,982	18,891	19,552
Sociology	3,248	3.396	3,507	3,759	3,834	3,846
Sociology/anthropology	443	454	502	436	475	456
Social sciences, n.e.c.	4.934	5.046	5,668	5.857	6,261	6,600

See explanatory information and SOURCE at end of table.

Appendix table 4-7. Male science and engineering graduate students in all institutions, by field: 1988–1993

Page 2 of 2

Field	1988	1989	1990	1991	1992	1993
Engineering	89,795	90,416	92,932	97,907	100,862	99,371
Aerospace engineering	2,996	3,281	3,645	3,793	3,688	3,590
Agricultural engineering	966	956	845	860	864	867
Biomedical engineering	1,310	1,442	1,589	1,651	1,920	1,976
Chemical engineering	5,543	5,431	5,589	5,870	6,003	6,000
Civil engineering	12,517	12,474	12,853	14,296	15,905	15,780
Electrical engineering	28,757	29,742	30,007	31,311	32,176	31,056
Engineering science	2,119	1,829	1,721	1,866	1,913	1,880
Industrial eng./management science	9,287	8,959	9,107	10,319	10,871	11,051
Mechanical engineering	14,774	14,814	15,346	16,219	16,939	16,700
Metallurgical/materials engineering	3,581	3,784	4,052	4,177	4,446	4,341
Nuclear engineering	1,176	1,182	1,123	1,105	1,100	1,121
Engineering, n.e.c.	6,769	6,522	7,055	6,440	5,037	5,009

KEY: n.e.c.= Not elsewhere classified

SOURCE: National Science Foundation/SRS, Survey of Graduate Students and Postdoctorates in Science and Engineering, 1993.

Appendix table 4-8. Women as a percent of science and engineering graduate students in all institutions, by field: 1988–1993

Page 1 of 2

Field	1988	1989	1990	1991	1992	1993
Total science and engineering	32.3	32.9	33.7	34.2	34.9	36.0
Sciences	39.7	40.3	41.2	41.9	42.6	43.5
Physical sciences	22.7	23.2	23.7	24.7	25.0	26.0
Astronomy	19.2	17.7	20.4	20.7	21.4	22.5
Chemistry	29.4	30.1	30.7	32.3	32.9	34.0
Physics	13.2	13.7	13.9	14.1	13.8	14.3
Physical sciences, n.e.c.	40.4	36.0	36.5	36.3	35.7	37.8
Earth, atmospheric, and ocean sciences	27.5	28.3	29.5	30.8	31.7	32.0
Atmospheric sciences	17.3	19.5	19.9	19.6	22.1	20.2
Geosciences	24.8	24.4	25.0	26.5	26.8	27.1
Oceanography	31.7	32.9	33.5	35.5	37.9	38.3
Earth, atmospheric, and ocean sciences, n.e.c.	37.3	40.1	40.6	39.6	39.8	40.1
Mathematical sciences	30.3	31.1	31.3	31.6	32.2	33.2
Computer sciences	25.4	24.6	23.9	23.8	23.2	23.2
Agricultural sciences	27.9	28.1	29.4	31.0	31.9	34.2
Biological sciences	44.7	45.5	46.1	46.6	47.0	47.9
Anatomy	43.4	44.5	45.8	47.7	47.9	48.0
Biochemistry	40.6	39.7	41.0	41.0	41.3	42.3
Biology	44.0	45.1	45.7	46.7	47.4	47.5
Biometry/epidemiology	54.3	57.1	53.3	54.7	56.2	57.4
Biophysics	25.2	24.7	25.5	26.1	26.9	29.0
Botany	38.2	38.3	39.3	39.5	39.1	40.5
Cell biology	40.7	42.3	43.8	45.6	45.5	46.7
Ecology	39.7	40.6	41.3	43.9	45.3	47.1
Entomology/parasitology	29.0	30.8	30.5	29.1	29.7	32.1
Genetics	48.8	50.5	51.6	49.9	51.4	52.2
Microbiology, immunology, and virology	45.2	46.4	47.6	47.7	47.6	48.7
Nutrition	71.2	71.3	70.5	70.2	71.0	71.6
Pathology	41.3	41.9	42.8	43.3	44.5	46.9
Pharmacology	39.9	42.7	43.5	46.5	46.7	46.9
Physiology	38.9	40.5	41.7	41.4	41.0	41.4
Zoology	38.6	38.0	39.7	40.3	38.7	40.6
Biological sciences, n.e.c.	44.9	45.2	44.5	43.8	45.0	45.3
Psychology	64.7	65.6	67.2	67.8	68.9	69.5
Social sciences	42.0	42.4	43.4	43.5	44.6	45.6
Agricultural economics	24.2	25.6	26.4	26.9	28.2	31.0
Anthropology (cultural and social)	58.0	58.4	58.5	58.7	59.6	59.7
Economics (except agricultural)	25.8	26.7	27.4	28.0	28.7	29.1
Geography	32.9	34.0	34.1	35.1	34.9	36.1
Linguistics	60.0	59.4	58.9	55.9	60.9	60.8
Political science	41.1	41.7	43.1	43.3	44.3	45.0
Sociology	54.2	54.1	55.0	55.1	57.3	59.1
Sociology/anthropology	55.3	55.6	58.1	54.1	54.5	55.3
Social sciences, n.e.c.	45.8	45.1	45.2	45.2	46.2	47.6

See explanatory information and SOURCE at end of table.

Appendix table 4-8. Women as a percent of science and engineering graduate students in all institutions, by field: 1988–1993

Page 2 of 2

Field	1988	1989	1990	1991	1992	1993
Engineering	12.8	13.1	13.6	13.8	14.6	15.1
Aerospace engineering	7.0	6.9	7.3	7.9	8.6	9.1
Agricultural engineering	8.2	8.3	10.7	12.8	14.3	14.8
Biomedical engineering	25.2	24.7	25.6	26.3	24.3	26.0
Chemical engineering	16.2	15.9	17.0	17.6	18.8	20.0
Civil engineering	15.5	16.3	17.3	17.8	18.7	19.8
Electrical engineering	10.2	10.6	11.0	11.0	11.8	12.2
Engineering science	11.2	11.9	14.8	13.4	13.8	14.0
Industrial eng./management science	18.4	19.0	19.0	18.5	19.6	19.0
Mechanical engineering	8.7	8.6	8.6	8.5	9.1	9.6
Metallurgical/materials engineering	17.4	17.6	18.1	19.2	19.5	19.1
Nuclear engineering	9.7	10.7	12.1	13.8	14.5	14.2
Engineering, n.e.c.	13.9	14.9	15.3	15.1	15.0	15.7

KEY: n.e.c.= Not elsewhere classified

SOURCE: National Science Foundation/SRS, Survey of Graduate Students and Postdoctorates in Science and Engineering, 1993.

Appendix table 4-9. Science and engineering graduate students in all institutions, by enrollment status, detailed field, and sex: 1993

Page 1 of 2

Enrollment status and field	Both sexes	Women		Men	
		Number	Percent	Number	Percent
Full-time:					
Total science and engineering	294.645	103,291	35.1	191,354	64.9
Sciences	220,683	92.081	41.7	128.602	58.3
Physical sciences	30,619	7,723	25.2	22,896	74.8
Astronomy	848	190	22.4	658	77.6
Chemistry	17,210	5,739	33.3	11,471	66.7
Physics	12,399	1,739	14.0	10.660	86.0
Physical sciences, n.e.c	162	55	34.0	107	66.0
Earth, atmospheric, and ocean sciences	11,403	3,564	31.3	7,839	68.7
Atmospheric sciences	980	197	20.1	783	79.9
Geosciences	5.971	1,633	27.3	4,338	72.7
Oceanography	2.218	803	36.2	1,415	63.8
Earth, atmospheric, and ocean sciences, n.e.c	2,234	931	41.7	1,303	58.3
Mathematical sciences	14,584	4,453	30.5	10,131	69.5
Computer sciences	17,458	3,581	20.5	13,877	79.5
Agricultural sciences	9,497	3,187	33.6	6,310	66.4
Biological sciences	46,547	21,567	46.3	24,980	53.7
Psychology	34,953	23,674	67.7	11,279	32.3
Social sciences	55,622	24,332	43.7	31,290	56.3
Economics	12,070	3,455	28.6	8,615	71.4
Political science	18,441	7,794	42.3	10,647	57.7
Sociology	7,244	4,178	57.7	3,066	42.3
Anthropology	5,429	3,171	58.4	2,258	41.6
Linguistics	2,571	1,505	58.5	1,066	41.5
History of sciences	334	128	38.3	206	61.7
Social sciences, n.e.c	9,533	4,101	43.0	5,432	57.0
Engineering	73,962	11,210	15.2	62,752	84.8
Aerospace engineering	3,266	291	8.9	2,975	91.1
Chemical engineering	6.021	1,163	19.3	4,858	80.7
Civil engineering	12,497	2,539	20.3	9.958	79.7
Electrical engineering	20,438	2,445	12.0	17,993	88.0
Mechanical engineering	12,441	1,185	9.5	11,256	90.5
Materials engineering	4,255	802	18.8	3,453	81.2
Industrial engineering	5,882	1,165	19.8	4,717	80.2
Engineering, n.e.c	9,162	1,620	17.7	7,542	82.3

See explanatory information and SOURCES at end of table.

Appendix table 4-9. Science and engineering graduate students in all institutions, by enrollment status, detailed field, and sex: 1993

Page 2 of 2

Enrollment status and field	Both sexes	Women		Men	
		Number	Percent	Number	Percent
Part-time:					
Total science and engineering	143,407	54,202	37.8	89,205	62.2
Sciences	100,263	47,677	47.6	52,586	52.4
Physical sciences	4,776	1,493	31.3	3,283	68.7
Astronomy	32	8	25.0	24	75.0
Chemistry	2,932	1,115	38.0	1,817	62.0
Physics	1,508	249	16.5	1,259	83.5
Physical sciences, n.e.c.	304	121	39.8	183	60.2
Earth, atmospheric, and ocean sciences	4,488	1,528	34.0	2,960	66.0
Atmospheric sciences	132	28	21.2	104	78.8
Geosciences	1,813	479	26.4	1,334	73.6
Oceanography	435	213	49.0	222	51.0
Earth, atmospheric, and ocean sciences, n.e.c.	2,108	808	38.3	1,300	61.7
Mathematical sciences	5,580	2,245	40.2	3,335	59.8
Computer sciences	18,889	4,840	25.6	14,049	74.4
Agricultural sciences	2,446	894	36.5	1,552	63.5
Biological sciences	9,993	5,509	55.1	4,484	44.9
Psychology	20,266	14,718	72.6	5,548	27.4
Social sciences	33,825	16,450	48.6	17,375	51.4
Economics	3,659	1,163	31.8	2,496	68.2
Political science	17,114	8,209	48.0	8,905	52.0
Sociology	3,179	1,943	61.1	1,236	38.9
Anthropology	1,949	1,231	63.2	718	36.8
Linguistics	816	554	67.9	262	32.1
History of sciences	35	14	40.0	21	60.0
Social sciences, n.e.c.	7,073	3,336	47.2	3,737	52.8
Engineering	43,144	6,525	15.1	36,619	84.9
Aerospace engineering	682	67	9.8	615	90.2
Chemical engineering	1,475	333	22.6	1,142	77.4
Civil engineering	7,178	1,356	18.9	5,822	81.1
Electrical engineering	14,939	1,876	12.6	13,063	87.4
Mechanical engineering	6,033	589	9.8	5,444	90.2
Materials engineering	1,112	224	20.1	888	79.9
Industrial engineering	7,766	1,432	18.4	6,334	81.6
Engineering, n.e.c.	3,959	648	16.4	3,311	83.6

KEY: n.e.c.= Not elsewhere classified

SOURCE: National Science Foundation/SRS, Survey of Graduate Students and Postdoctorates in Science and Engineering, 1993.

Appendix table 4-10. Full-time science and engineering graduate students in all institutions, by sex and field: 1988–1993

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Sex and year	All S&E fields, total	Total sciences	Physical sciences	Earth, atmos, & ocean sciences	Mathematical sciences	Agricultural sciences	Biological science	Psychology	Social sciences
Both sexes:									
1988	250,788	187,722	28,574	10,199	28,646	9,123	39,214	28,224	43,742
1989	256,993	192,585	29,207	10,027	29,289	9,076	40,361	29,478	45,147
1990	265,527	199,529	29,492	10,262	30,557	9,092	40,959	30,791	48,376
1991	277,385	206,286	30,125	10,395	30,796	9,291	42,718	32,443	50,518
1992	290,857	216,302	30,675	11,011	32,179	9,442	44,432	34,350	54,213
1993	294,645	220,683	30,619	11,403	32,042	9,497	46,547	34,953	55,622
Women:									
1988	78,406	70,768	6,366	2,749	7,056	2,487	16,803	17,989	17,318
1989	81,916	73,754	6,660	2,756	7,186	2,516	17,616	18,975	18,045
1990	86,833	78,121	6,824	2,933	7,513	2,638	18,164	20,095	19,954
1991	92,233	82,530	7,273	3,184	7,706	2,863	19,211	21,439	20,854
1992	98,911	88,223	7,500	3,413	7,991	2,998	20,173	23,118	23,030
1993	103,291	92,081	7,723	3,564	8,034	3,187	21,567	23,674	24,332
Men:									
1988	172,382	116,954	22,208	7,450	21,590	6,636	22,411	10,235	26,424
1989	175,077	118,831	22,547	7,271	22,103	6,560	22,745	10,503	27,102
1990	178,694	121,408	22,668	7,329	23,044	6,454	22,795	10,696	28,422
1991	185,152	123,756	22,852	7,211	23,090	6,428	23,507	11,004	29,664
1992	191,946	128,079	23,175	7,598	24,188	6,444	24,259	11,232	31,183
1993	191,354	128,602	22,896	7,839	24,008	6,310	24,980	11,279	31,290

Sex and year	Total engineering	Aerospace engineering	Chemical engineering	Civil engineering	Electrical engineering	Mechanical engineering	Materials engineering	Industrial engineering	Other engineering
Both sexes:									
1988	63,066	2,533	5,359	9,946	17,706	10,426	3,466	4,294	9,336
1989	64,408	2,772	5,282	9,964	18,466	10,464	3,720	4,664	9,076
1990	65,998	3,010	5,443	10,128	18,675	10,816	3,936	4,779	9,211
1991	71,099	3,325	5,788	11,328	19,904	11,687	4,066	5,607	9,394
1992	74,555	3,306	5,946	12,439	21,010	12,433	4,281	6,088	9,052
1993	73,962	3,266	6,021	12,497	20,438	12,441	4,255	5,882	9,162
Women:									
1988	7,638	168	792	1,565	1,682	835	579	736	1,281
1989	8,162	180	796	1,649	1,822	855	639	908	1,313
1990	8,712	199	896	1,781	1,956	848	694	909	1,429
1991	9,703	254	985	2,019	2,165	942	746	1,042	1,550
1992	10,688	263	1,097	2,326	2,431	1,086	812	1,175	1,498
1993	11,210	291	1,163	2,539	2,445	1,185	802	1,165	1,620
Men:									
1988	55,428	2,365	4,567	8,381	16,024	9,591	2,887	3,558	8,055
1989	56,246	2,592	4,486	8,315	16,644	9,609	3,081	3,756	7,763
1990	57,286	2,811	4,547	8,347	16,719	9,968	3,242	3,870	7,782
1991	61,396	3,071	4,803	9,309	17,739	10,745	3,320	4,565	7,844
1992	63,867	3,043	4,849	10,113	18,579	11,347	3,469	4,913	7,554
1993	62,752	2,975	4,858	9,958	17,993	11,256	3,453	4,717	7,542

SOURCE: National Science Foundation/SRS, Survey of Graduate Students and Postdoctorates in Science and Engineering, 1993.

Appendix table 4-11. Top 50 institutions enrolling female graduate students in science and engineering, ranked by 1993 number of women enrolled in science and engineering: 1988–1993

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	Academic institution	1988	1989	1990	1991	1992	1993
All academic institutions		121,429	126,264	134,222	141,359	150,684	157,493
1	University of Minnesota, all campuses	1,613	1,748	1,711	1,791	1,876	2,000
2	University of Wisconsin-Madison	1,415	1,475	1,565	1,639	1,720	1,777
3	George Washington University	1,388	1,373	1,440	1,468	1,544	1,567
4	Rutgers the State Univ of NJ, all campuses	1,319	1,408	1,437	1,465	1,544	1,526
5	University of Michigan, all campuses	1,168	1,179	1,247	1,251	1,395	1,522
6	University of Colorado, all campuses	907	982	1,124	1,220	1,344	1,476
7	Indiana University, all campuses	705	912	1,252	1,331	1,419	1,472
8	University of California-Berkeley	1,295	1,293	1,398	1,377	1,409	1,447
9	New York University	1,094	1,301	1,252	1,386	1,325	1,421
10	Ohio State University, all campuses	1,164	1,160	1,132	1,330	1,325	1,390
	Subtotal, first 10 institutions	12,068	12,831	13,558	14,258	14,901	15,598
11	University of Illinois at Urbana-Champaign	1,171	1,199	1,178	1,202	1,335	1,379
12	University of Southern California	1,616	1,500	1,228	1,238	1,368	1,369
13	University of Washington	1,135	1,183	1,275	1,311	1,332	1,325
14	Texas A&M University, all campuses	1,102	1,202	1,305	1,286	1,391	1,320
15	Cornell University, all campuses	1,010	1,034	1,051	1,097	1,308	1,298
16	University of Maryland at College Park	1,109	1,155	1,197	1,173	1,248	1,292
17	Harvard University	892	854	946	1,025	1,225	1,269
18	Pennsylvania State U, all campuses	1,124	1,144	1,168	1,207	1,218	1,257
19	University of California-Los Angeles	875	916	924	1,027	1,074	1,188
20	American University	620	690	765	846	1,052	1,186
	Subtotal, first 20 institutions	22,722	23,708	24,595	25,670	27,452	28,481
21	University of Texas at Austin	898	931	923	1,047	1,104	1,155
22	Teachers College, Columbia University	1,067	1,026	968	1,029	1,063	1,131
23	University of Pittsburgh, all campuses	713	740	845	883	1,109	1,130
24	Antioch University, all campuses	843	758	846	1,108	1,139	1,105
25	University of Massachusetts Central Office	913	890	959	975	996	1,070
26	Michigan State University	767	863	854	900	958	1,060
27	Purdue University, all campuses	889	896	896	894	970	1,051
28	Stanford University	865	919	892	949	1,020	1,039
29	Arizona State University, main campus	672	690	792	844	989	1,035
30	University of North Carolina at Chapel Hill	832	913	943	913	979	1,031
	Subtotal, first 30 institutions	31,181	32,334	33,513	35,212	37,779	39,288
31	Massachusetts Institute of Technology	794	853	942	961	967	1,020
32	Boston University	685	688	817	825	877	991
33	University of Florida	797	757	804	830	890	975
34	University of Houston	440	552	769	995	1,045	968
35	SUNY at Buffalo, all campuses	825	785	841	916	934	961
36	Nova Southeastern University	707	663	673	762	845	954
37	University of Arizona	871	880	857	881	901	939
38	Virginia Polytechnic Institute and State Univ	683	808	850	852	876	927
39	North Carolina State University at Raleigh	799	826	809	837	921	920
40	University of California-Davis	852	861	922	853	860	912
	Subtotal, first 40 institutions	38,634	40,007	41,797	43,924	46,895	48,855
41	Iowa State University	796	793	828	821	838	898
42	George Mason University	638	681	752	759	801	896
43	SUNY at Albany	430	459	505	534	843	892
44	Louisiana State Univ, all campuses	625	605	664	732	809	888
45	Pepperdine University	510	540	581	730	818	883
46	St Mary's College of Minnesota	256	336	418	669	786	813
47	University of Illinois at Chicago	638	714	760	807	838	809
48	University of Connecticut, all campuses	621	636	694	749	803	809
49	University of Pennsylvania	759	817	790	797	785	804
50	Georgia Institute of Technology, all campuses	508	515	601	702	745	790
	Total, first 50 institutions	44,415	46,103	48,390	51,224	54,961	57,337

SOURCE: National Science Foundation/SRS, Survey of Graduate Students and Postdoctorates in Science and Engineering, 1993.

Appendix table 4-12. Science and engineering graduate students in all institutions, by enrollment status, citizenship status, and race/ethnicity: 1988–1993

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Enrollment status, citizenship status, and race/ethnicity	1988	1989	1990	1991	1992	1993
Total enrollment	375,579	383,227	397,866	413,559	431,444	438,052
Total U.S. citizens	281,901	285,134	295,018	304,856	322,027	332,525
Black	11,201	11,771	12,786	13,694	15,457	17,181
American Indian	920	861	1,053	1,120	1,240	1,318
Asian	15,176	15,650	17,128	18,072	21,840	24,401
Hispanic	9,102	9,438	10,180	11,064	12,278	13,446
White	229,233	230,130	239,109	244,359	254,096	258,278
Other or unknown	16,269	17,284	14,762	16,547	17,116	17,901
Non-U.S. citizens	93,678	98,093	102,848	108,703	109,417	105,527
Full-time enrollment	250,788	256,993	265,527	277,385	290,857	294,645
Total U.S. citizens	170,316	173,497	177,928	185,634	197,873	205,405
Black	6,063	6,577	7,011	7,671	8,924	9,939
American Indian	571	552	654	717	847	904
Asian	9,447	9,774	10,572	11,187	13,447	15,492
Hispanic	5,506	5,926	6,392	6,933	7,619	8,231
White	141,016	142,549	146,828	151,117	158,602	161,867
Other or unknown	7,713	8,119	6,471	8,009	8,434	8,972
Non-U.S. citizens	80,472	83,496	87,599	91,751	92,984	89,240
Part-time enrollment	124,791	126,234	132,339	136,174	140,587	143,407
Total U.S. citizens	111,585	111,637	117,090	119,222	124,154	127,120
Black	5,138	5,194	5,775	6,023	6,533	7,242
American Indian	349	309	399	403	393	414
Asian	5,729	5,876	6,556	6,885	8,393	8,909
Hispanic	3,596	3,512	3,788	4,131	4,659	5,215
White	88,217	87,581	92,281	93,242	95,494	96,411
Other or unknown	8,556	9,165	8,291	8,538	8,682	8,929
Non-U.S. citizens	13,206	14,597	15,249	16,952	16,433	16,287

SOURCE: National Science Foundation/SRS, Survey of Graduate Students and Postdoctorates in Science and Engineering, 1993.

Appendix table 4-13. Science and engineering graduate students in all institutions, by field, race/ethnicity, and citizenship: 1993

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Field	Total	Race/ethnicity of U.S. citizens						Non-citizens
		White, non-Hispanic	Asian	Black, non-Hispanic	Hispanic	American Indian	Other or unknown	
Total science and engineering	438,052	258,278	24,401	17,181	13,446	1,318	17,901	105,527
Sciences	320,946	200,709	15.290	14,613	10,749	1,106	12,174	66,305
Physical sciences	35,395	18,636	1,974	843	751	81	870	12,240
Astronomy	880	580	24	12	13	3	31	217
Chemistry	20,142	10,678	1,185	594	472	54	491	6,668
Physics	13,907	7,068	734	211	256	22	337	5,279
Physical sciences, n.e.c.	466	310	31	26	10	2	11	76
Earth, atmospheric, and ocean sciences	15,891	11,232	445	230	354	46	540	3,044
Atmospheric sciences	1,112	714	55	13	15	2	16	297
Geosciences	7,784	5,386	193	67	157	27	258	1,696
Oceanography	2,653	1,739	66	29	90	3	128	598
Earth, atmos, and ocean sciences, n.e.c.	4,342	3,393	131	121	92	14	138	453
Mathematical sciences	20,164	10,657	1.076	721	425	33	1,149	6,103
Computer sciences	36,347	16,863	3,530	1,170	693	66	1,977	12,048
Agricultural sciences	11,943	7,740	262	261	307	34	209	3,130
Biological sciences	56,540	35,157	3,523	1,737	1,649	157	1,458	12,859
Anatomy	1,027	598	86	30	24	2	42	245
Biochemistry	5,528	2,831	475	112	126	18	101	1,865
Biology	14,395	9,583	850	616	560	47	649	2,090
Biometry/epidemiology	2,665	1,577	187	108	130	14	43	606
Biophysics	780	441	83	18	9	0	13	216
Botany	2,742	1,641	81	52	38	8	32	890
Cell biology	3,391	2,172	284	57	83	7	46	742
Ecology	1,410	1,084	29	14	36	6	64	177
Entomology/parasitology	1,247	758	50	23	34	1	29	352
Genetics	1,785	1,220	92	36	30	1	24	382
Microbiology, immunology, and virology	5,053	3,044	369	150	163	11	68	1,248
Nutrition	4,320	2,452	207	155	104	14	78	1,310
Pathology	1,617	990	105	47	40	3	54	378
Pharmacology	2,655	1,594	206	99	61	12	49	634
Physiology	2,372	1,366	178	93	68	1	45	621
Zoology	2,120	1,653	56	18	50	4	44	295
Biological sciences, n.e.c.	3,433	2,153	185	109	93	8	77	808
Psychology	55,219	43,254	1.477	3,304	2,601	296	2,380	1,907
Social sciences	89,447	57,170	3,003	6,347	3,969	393	3,591	14,974
Agricultural economics	2.415	1,149	41	78	70	4	42	1,031
Anthropology (cultural and social)	7,378	5,592	148	176	264	80	305	813
Economics (except agricultural)	13,314	6,094	713	404	339	19	563	5,182
Geography	4,378	3,364	107	111	109	24	146	517
Linguistics	3,387	1,828	144	62	172	4	132	1,045
Political science	35,555	24.226	1.079	3,254	1,897	140	1,404	3,555
Sociology	9.404	5,838	334	861	468	58	413	1,432
Sociology/anthropology	1,019	731	7	123	19	4	20	115
Social sciences, n.e.c.	12.597	8,348	430	1.278	631	60	566	1.284

See explanatory information and SOURCE at end of table.

Appendix table 4-13. Science and engineering graduate students in all institutions, by field, race/ethnicity, and citizenship: 1993

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Field	Total	Race/ethnicity of U.S. citizens						Non-citizens
		White, non-Hispanic	Asian	Black, non-Hispanic	Hispanic	American Indian	Other or unknown	
Engineering	117,106	57,569	9,111	2,568	2,697	212	5,727	39.222
Aerospace engineering	3,948	2,077	224	56	71	8	310	1,202
Agricultural engineering	1,018	467	47	10	7	0	4	483
Biomedical engineering	2,672	1,445	249	45	78	2	75	778
Chemical engineering	7,496	3,385	528	159	180	14	146	3,084
Civil engineering	19,675	10,462	1,143	393	551	44	724	6,358
Electrical engineering	35,377	15,694	3,759	865	837	44	1,746	12,432
Engineering science	2,185	1,223	141	44	40	2	68	667
Industrial eng./management science	13,648	7,455	894	444	334	37	1,048	3,436
Mechanical engineering	18,474	9,029	1,335	336	385	30	1,111	6,248
Metallurgical/materials engineering	5,367	2,543	335	73	76	4	171	2,165
Nuclear engineering	1,306	731	54	15	29	3	7	467
Engineering, n.e.c.	5,940	3,058	402	128	109	24	317	1,902

KEY: n.e.c.= Not elsewhere classified

SOURCE: National Science Foundation/SRS, Survey of Graduate Students and Postdoctorates in Science and Engineering, 1993.

Appendix table 4-14. Top 50 institutions enrolling Asian graduate students in science and engineering, ranked by 1993 total number of Asian graduate students enrolled: 1988–1993

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Academic institution	1988	1989	1990	1991	1992	1993
All academic institutions	15,176	15,650	17,128	18,072	21,840	24,401
1 San Jose State University	126	187	373	450	805	730
2 University of Southern California	620	549	479	549	645	656
3 University of California-Los Angeles	295	312	350	396	535	619
4 University of Houston	110	194	459	536	526	577
5 Stanford University	345	314	411	409	416	501
6 University of California-Berkeley	282	291	357	360	389	423
7 California State University-Long Beach	208	242	251	281	413	366
8 Polytechnic University	146	154	126	149	152	359
9 University of Illinois at Urbana-Champaign	312	226	315	315	303	340
10 Massachusetts Institute of Technology	231	278	318	312	317	329
Subtotal, first 10 institutions	2,675	2,747	3,439	3,757	4,501	4,900
11 Rutgers the State Univ of NJ, all campuses	139	139	121	119	198	328
12 University of Hawaii at Manoa	242	255	234	266	265	314
13 University of Minnesota, all campuses	95	100	142	141	220	310
14 Santa Clara University	299	282	222	201	284	289
15 Columbia University in the City of New York	111	73	113	160	258	288
16 Purdue University, all campuses	112	94	89	94	130	287
17 George Washington University	92	96	120	142	248	273
18 George Mason University	96	128	150	166	167	267
19 University of Michigan, all campuses	95	158	116	169	210	262
20 Pennsylvania State U, all campuses	116	151	160	144	194	260
Subtotal, first 20 institutions	4,072	4,223	4,906	5,359	6,675	7,778
21 University of California-Irvine	113	134	128	157	191	255
22 New Jersey Institute of Technology	713	678	543	416	407	251
23 University of Washington	153	159	164	194	229	245
24 Georgia Institute of Technology, all campuses	113	85	108	129	215	227
25 University of California-Davis	128	107	124	145	208	224
26 University of Illinois at Chicago	197	203	158	186	215	214
27 University of Maryland at College Park	165	166	172	175	195	213
28 University of Colorado, all campuses	72	88	139	161	165	208
29 Ohio State University, all campuses	54	46	102	102	212	203
30 Texas A&M University, all campuses	58	70	71	95	157	197
Subtotal, first 30 institutions	5,838	5,959	6,615	7,119	8,869	10,015
31 De Paul University	225	230	237	223	199	194
32 California State University-Northridge	71	83	80	140	219	174
33 Illinois Institute of Technology	71	93	126	120	144	171
34 University of California-San Diego	88	80	126	139	147	166
35 Wayne State University	28	71	134	126	195	166
36 CUNY City College	140	83	100	187	162	163
37 Harvard University	92	93	110	129	146	158
38 San Diego State University	93	103	112	106	157	152
39 California State University-Los Angeles	115	129	124	133	150	151
40 Cornell University, all campuses	123	133	146	153	152	149
Subtotal, first 40 institutions	6,884	7,057	7,910	8,575	10,540	11,659
41 SUNY at Stony Brook, all campuses	81	103	110	123	137	146
42 San Francisco State University	61	104	62	70	125	146
43 University of Texas at Austin	105	82	73	61	127	145
44 University of Texas at Arlington	123	136	119	159	135	145
45 Northwestern University	82	88	89	96	107	142
46 Johns Hopkins University	42	95	115	91	115	140
47 New York University	91	84	117	100	122	139
48 University of Pennsylvania	97	101	96	97	134	137
49 University of Wisconsin-Madison	141	148	127	133	135	136
50 University of Chicago	44	55	61	78	118	131
Total, first 50 institutions	7,751	8,053	8,879	9,583	11,795	13,066

SOURCE: National Science Foundation/SRS, Survey of Graduate Students and Postdoctorates in Science and Engineering, 1993.

Appendix table 4-15. Top 50 institutions enrolling black graduate students in science and engineering, ranked by 1993 total number of black graduate students enrolled: 1988–1993

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	Academic institution	1988	1989	1990	1991	1992	1993
	All academic institutions	11,201	11,771	12,786	13,694	15,457	17,181
* 1	Howard University	459	439	444	400	374	444
2	Chicago State University	83	110	107	103	127	351
* 3	Clark Atlanta University	177	128	170	224	286	275
4	Georgia Institute of Technology, all campuses	86	103	146	180	246	258
5	University of Michigan, all campuses	126	148	155	186	225	237
* 6	Jackson State University	147	185	196	179	175	217
7	New York University	146	130	154	193	201	214
8	Long Island University, all campuses	103	84	119	134	185	197
9	George Washington University	141	121	147	152	191	194
10	University of Maryland at College Park	126	152	156	167	161	186
	Subtotal, first 10 institutions	1,594	1,600	1,794	1,918	2,171	2,573
11	Teachers College, Columbia University	132	131	128	132	139	174
* 12	Southern University A&M Col, all campuses	79	93	171	165	158	172
13	California State University-Dominguez Hills	101	124	146	148	160	161
14	Rutgers the State Univ of NJ, all campuses	119	134	144	141	167	160
15	American University	68	72	89	96	153	154
16	University of Southern California	199	190	136	118	141	152
17	CUNY John Jay College of Criminal Justice	116	118	131	136	146	151
18	Wayne State University	91	135	133	146	164	149
19	Louisiana State Univ, all campuses	74	74	96	95	122	148
20	Georgia State University	116	128	127	116	129	147
	Subtotal, first 20 institutions	2,689	2,799	3,095	3,211	3,650	4,141
* 21	North Carolina Agricultural & Tech State Univ	78	95	100	104	116	146
22	Ohio State University, all campuses	98	99	101	118	136	145
23	CUNY City College	102	70	92	126	125	145
24	De Paul University	99	124	111	121	123	144
* 25	Prairie View A&M University	77	75	72	78	104	135
26	Michigan State University	54	73	64	89	123	133
27	Indiana University, all campuses	27	33	90	95	137	132
* 28	Texas Southern University	92	103	97	107	101	131
29	Virginia Commonwealth University	87	87	114	102	110	130
30	Roosevelt University	100	88	78	73	85	121
	Subtotal, first 30 institutions	3,503	3,646	4,014	4,224	4,810	5,503
31	North Carolina State University at Raleigh	125	120	119	114	133	120
32	University of North Carolina at Chapel Hill	72	66	78	69	101	119
* 33	Florida Agricultural and Mechanical University	82	75	66	87	85	116
* 34	Alabama Agricultural and Mechanical Univ	60	71	87	90	99	115
35	University of California-Berkeley	105	118	104	119	121	111
36	University of Florida	94	93	99	88	110	110
37	Governors State University	41	56	93	120	121	110
38	University of Houston	27	36	64	98	109	106
39	Virginia Polytechnic Institute and State Univ	21	39	62	70	74	104
40	University of Detroit Mercy	24	56	53	71	73	104
	Subtotal, first 40 institutions	4,154	4,376	4,839	5,150	5,836	6,618
41	Harvard University	73	85	92	98	103	104
42	University of Illinois at Chicago	58	64	75	95	104	103
43	Pennsylvania State U, all campuses	90	90	84	86	95	100
44	Massachusetts Institute of Technology	76	76	72	74	98	99
45	Illinois Institute of Technology	55	43	67	65	65	97
* 46	North Carolina Central University	55	45	64	62	57	95
47	University of Pittsburgh, all campuses	56	66	70	51	72	93
48	University of Baltimore	69	76	79	77	87	93
49	University of Illinois at Urbana-Champaign	47	57	77	73	84	91
50	University of Cincinnati, all campuses	65	65	63	61	71	91
	Total, first 50 institutions	4,798	5,043	5,582	5,892	6,672	7,584

KEY: * = Indicates Historically Black Colleges or Universities (HBCUs)

SOURCE: National Science Foundation/SRS, Survey of Graduate Students and Postdoctorates in Science and Engineering, 1993.

Appendix table 4-16. Top 50 institutions enrolling Hispanic graduate students in science and engineering, ranked by 1993 total number of Hispanic graduate students enrolled: 1988–1993

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		Academic institution	1988	1989	1990	1991	1992	1993
		All academic institutions	9,102	9,438	10,180	11,064	12,278	13,446
*	1	University of Puerto Rico, Rio Piedras Campus	901	963	1,058	957	1,047	1,093
*	2	University of Puerto Rico, Mayaguez Campus	291	243	233	254	279	345
*	3	Florida International University	78	171	177	190	216	248
	4	University of California-Berkeley	133	146	154	174	194	198
	5	University of Southern California	256	207	144	173	189	189
*	6	Texas A&M University, all campuses	188	226	192	195	207	183
	7	Center for Adv Stud on Puerto Rico and Caribbn	235	205	208	365	162	178
*	8	University of New Mexico, all campuses	129	156	134	143	182	172
	9	University of Texas at Austin	115	130	117	136	154	168
	10	University of Texas at El Paso	146	190	198	182	184	166
		Subtotal, first 10 institutions	2,472	2,637	2,615	2,769	2,814	2,940
	11	University of Miami	147	107	109	117	131	158
	12	University of Colorado, all campuses	73	80	96	107	142	147
	13	University of Michigan, all campuses	80	87	94	116	132	141
	14	University of California-Los Angeles	81	99	88	124	121	140
	15	Stanford University	78	73	126	146	122	139
	16	California State University-Long Beach	73	100	106	106	134	136
*	17	Texas A&M University, Kingsville	53	40	61	78	122	134
*	18	University of PR, Medical Sciences Campus	59	80	70	112	89	133
*	19	California State University-Los Angeles	104	102	117	132	138	131
	20	Nova Southeastern University	55	59	80	54	102	125
		Subtotal, first 20 institutions	3,275	3,464	3,562	3,861	4,047	4,324
*	21	New Mexico State University, all campuses	68	82	96	98	118	124
	22	California State University-Northridge	21	27	27	55	101	123
	23	University of Arizona	73	72	104	86	106	121
	24	University of Houston	48	58	60	128	125	120
	25	Arizona State University, main campus	58	69	83	104	115	117
	26	University of Florida	76	74	87	94	97	116
	27	University of Wisconsin-Madison	73	82	71	74	87	107
	28	Harvard University	65	52	50	59	98	104
	29	Georgia Institute of Technology, all campuses	80	64	75	89	99	104
*	30	San Diego State University	59	51	83	76	113	100
		Subtotal, first 30 institutions	3,896	4,095	4,298	4,724	5,106	5,460
	31	University of California-Davis	62	65	76	80	93	99
	32	University of South Florida	56	58	55	86	99	98
	33	George Washington University	73	68	76	87	107	96
	34	Rutgers the State Univ of NJ, all campuses	86	77	78	77	79	93
	35	New York University	89	91	77	89	99	91
	36	CUNY City College	69	57	66	79	86	89
	37	American University	41	57	45	50	68	87
	38	CUNY John Jay College of Criminal Justice	53	49	53	65	74	87
	39	University of California-San Diego	44	42	55	56	74	82
	40	Teachers College, Columbia University	81	75	84	85	85	81
		Subtotal, first 40 institutions	4,550	4,734	4,963	5,478	5,970	6,363
	41	University of Illinois at Urbana-Champaign	64	60	59	60	65	79
	42	Polytechnic University (New York)	40	39	31	30	39	79
	43	Cornell University, all campuses	67	58	62	65	66	79
	44	Massachusetts Institute of Technology	43	59	58	61	77	76
	45	Long Island University, all campuses	16	9	30	89	110	74
*	46	University of Texas at San Antonio	21	30	59	60	71	73
	47	Pennsylvania State U, all campuses	29	35	44	51	46	73
	48	San Jose State University	41	49	56	63	72	72
	49	CUNY Graduate School and University Center	80	59	64	54	65	71
	50	University of Washington	40	49	48	54	54	70
		Total, first 50 institutions	4,991	5,181	5,474	6,065	6,635	7,109

KEY = * = Indicates member of the Hispanic Association of Colleges and Universities

SOURCE: National Science Foundation/SRS, Survey of Graduate Students and Postdoctorates in Science and Engineering, 1993.

Appendix table 4-17. Top 50 institutions enrolling American Indian graduate students in science and engineering, ranked by 1993 total number of American Indian graduate students enrolled: 1988–1993

Page 1 of 1

	Academic institution	1988	1989	1990	1991	1992	1993
All academic institutions		920	861	1,053	1,120	1,240	1,318
1	University of Oklahoma, all campuses	23	23	27	33	42	45
2	Northern Arizona University	18	17	54	24	30	33
3	Northeastern State University	0	0	17	20	25	26
4	University of Colorado, all campuses	11	15	15	19	19	25
5	Oklahoma State University, all campuses	22	22	15	24	24	25
6	Harvard University	8	8	14	17	20	23
7	Cornell University, all campuses	8	11	10	9	16	22
8	University of Arizona	10	18	16	13	21	21
9	University of Minnesota, all campuses	14	4	9	3	12	20
10	University of Washington	14	14	9	14	17	18
	Subtotal, first 10 institutions	128	132	186	176	226	258
11	CUNY College of Staten Island	0	0	0	0	18	18
12	University of New Mexico, all campuses	29	25	26	23	20	18
13	University of California-Los Angeles	5	7	7	11	16	16
14	University of California-Berkeley	13	20	14	11	13	16
15	University of Wisconsin-Madison	16	11	14	13	12	16
16	New Mexico State University, all campuses	7	6	5	7	9	16
17	George Washington University	1	5	9	15	22	15
18	Arizona State University, main campus	8	7	6	12	15	15
19	Stanford University	14	19	15	17	16	14
20	University of Michigan, all campuses	13	9	21	10	14	14
	Subtotal, first 20 institutions	234	241	303	295	381	416
21	Ohio State University, all campuses	3	3	3	13	9	14
22	San Diego State University	5	6	5	4	12	14
23	University of Maryland at College Park	4	3	5	5	8	11
24	California State University-Fullerton	9	8	5	5	10	10
25	University of North Carolina at Chapel Hill	7	10	14	9	12	10
26	California School Prof Psych at Los Angeles	0	1	6	6	9	10
27	Utah State University	10	11	9	15	20	10
28	Colorado State University	9	6	4	6	7	10
29	University of Denver	2	3	1	3	5	10
30	Auburn University, all campuses	2	2	1	5	8	10
	Subtotal, first 30 institutions	285	294	356	366	481	525
31	University of Illinois at Chicago	17	3	4	6	6	9
32	Texas A&M University, all campuses	6	9	13	12	9	9
33	University of Florida	8	7	9	10	6	9
34	University of Kansas, all campuses	4	6	4	4	8	9
35	University of Idaho	1	0	2	3	5	9
36	San Jose State University	12	9	8	10	6	8
37	University of Southern California	7	4	6	4	4	8
38	University of Houston	1	6	12	14	16	8
39	California State University-Los Angeles	5	3	4	4	3	8
40	University of Texas at Austin	3	4	9	8	7	8
	Subtotal, first 40 institutions	349	345	427	441	551	610
41	Michigan State University	5	7	6	7	8	8
42	California State University-Fresno	9	4	4	7	3	8
43	University of Tennessee at Knoxville	2	1	6	8	7	8
44	Mississippi State University	1	1	0	3	2	8
45	John F. Kennedy University	0	0	5	7	9	8
46	University of Wisconsin-Milwaukee	5	6	8	11	9	8
47	Oakland University	1	1	0	0	1	8
48	University of Akron, all campuses	0	0	2	4	10	8
49	Miami University, all campuses	0	1	1	1	0	8
50	Humboldt State University	0	0	0	15	12	8
	Total, first 50 institutions	372	366	459	504	612	690

SOURCE: National Science Foundation/SRS, Survey of Graduate Students and Postdoctorates in Science and Engineering, 1993.

Appendix table 4-18. Selected characteristics of graduate students with disabilities, by control of institution and program of study: 1993

[Percent distribution]

Page 1 of 1

Characteristic	Control of institution		Program of study	
	Public 4-year	Independent 4-year	Master's	Doctorate
Veteran status:				
No	86	85	82	77
Yes	14	15	18	23
Total	100	100	100	100
Attendance status:				
Full-time	35	30	18	12
Part-time	65	70	82	88
Total	100	100	100	100
Major field of study:				
Humanities	8	11	9	4
Social behavior	8	10	10	5
Life science	8	5	7	4
Physical science	4	2	1	5
Mathematics	3	2	2	5
Computer information/science	3	2	3	3
Engineering	8	1	3	3
Education	32	35	45	30
Business/management	9	12	9	22
Health	7	9	6	6
Vocational/technical	1	1	2	0
Other technical	0	0	0	0
Other	9	10	3	13
Total	100	100	100	100

SOURCE: Henderson, Cathy. 1995. Special Report to the National Science Foundation on Postbaccalaureate Students with Disabilities. Tabulations of data from the U.S. Department of Education/NCES 1992–93 National Postsecondary Student Aid Study.

Appendix table 4-19. Master's and doctoral degrees in all fields and in science and engineering, by sex: 1966–1993

Page 1 of 3

Field and year	Master's			Doctorate		
	Men	Women	Percent women	Men	Women	Percent women
Total, all fields:						
1966	93,184	47,588	33.8	15,863	2,086	11.6
1967	103,179	54,713	34.7	17,961	2,442	12.0
1968	113,749	63,401	35.8	20,005	2,932	12.8
1969	121,881	72,533	37.3	22,355	3,388	13.2
1970	126,146	83,241	39.8	25,527	3,971	13.5
1971	138,590	92,896	40.1	27,271	4,596	14.4
1972	150,085	102,689	40.6	27,754	5,287	16.0
1973	155,000	109,525	41.4	27,670	6,085	18.0
1974	158,344	119,915	43.1	26,594	6,453	19.5
1975	162,115	131,536	44.8	25,751	7,201	21.9
1976	167,745	145,256	46.4	25,262	7,684	23.3
1977	168,210	150,031	47.1	23,858	7,858	24.8
1978	161,708	151,108	48.3	22,553	8,322	27.0
1979	153,772	148,303	49.1	22,302	8,937	28.6
1980	151,159	147,936	49.5	21,612	9,408	30.3
1981	147,431	149,367	50.3	21,464	9,892	31.5
1982	145,941	150,639	50.8	21,018	10,093	32.4
1983	145,114	145,817	50.1	20,749	10,533	33.7
1984	143,998	141,464	49.6	20,638	10,699	34.1
1985	143,716	143,497	50.0	20,554	10,744	34.3
1986	143,932	145,897	50.3	20,594	11,305	35.4
1987	141,655	149,777	51.4	20,939	11,428	35.3
1988	145,403	154,688	51.5	21,681	11,818	35.3
1989	149,399	161,651	52.0	21,812	12,512	36.5
1990	154,025	170,922	52.6	22,962	13,106	36.3
1991	156,895	181,603	53.6	23,647	13,870	37.0
1992	162,299	191,908	54.2	24,433	14,420	37.1
1993	169,753	201,220	54.2	24,646	15,108	38.0

See explanatory information and SOURCES at end of table.

Appendix table 4-19. Master's and doctoral degrees in all fields and in science and engineering, by sex: 1966–1993

Page 2 of 3

Field and year	Master's			Doctorate		
	Men	Women	Percent women	Men	Women	Percent women
Science and engineering:						
1966	35,580	5,469	13.3	10,646	924	8.0
1967	38,682	6,306	14.0	12,013	1,096	8.4
1968	41,551	7,209	14.8	13,328	1,317	9.0
1969	44,182	8,200	15.7	14,781	1,507	9.3
1970	43,973	9,722	18.1	16,404	1,648	9.1
1971	46,116	10,338	18.3	17,385	1,996	10.3
1972	48,721	11,328	18.9	17,191	2,151	11.1
1973	50,233	11,813	19.0	16,853	2,520	13.0
1974	49,528	12,711	20.4	16,043	2,671	14.3
1975	49,410	13,788	21.8	15,870	2,929	15.6
1976	49,992	15,015	23.1	15,375	3,097	16.8
1977	50,899	16,498	24.5	14,775	3,233	18.0
1978	50,034	17,230	25.6	14,199	3,454	19.6
1979	46,614	17,612	27.4	14,128	3,744	20.9
1980	46,004	18,085	28.2	13,814	3,961	22.3
1981	45,505	18,861	29.3	14,056	4,201	23.0
1982	46,557	20,011	30.1	13,925	4,350	23.8
1983	46,718	20,998	31.0	13,920	4,715	25.3
1984	47,033	21,531	31.4	13,956	4,792	25.6
1985	48,232	22,330	31.6	14,045	4,891	25.8
1986	48,611	23,220	32.3	14,270	5,167	26.6
1987	48,759	23,844	32.8	14,582	5,312	26.7
1988	49,820	23,835	32.4	15,271	5,662	27.0
1989	50,845	25,530	33.5	15,622	6,109	28.1
1990	51,230	26,558	34.1	16,498	6,370	27.9
1991	50,441	27,927	35.6	17,087	6.931	28.9
1992	52,157	28,950	35.7	17,594	7,082	28.7
1993	55,454	30,971	35.8	17,786	7,652	30.1

See explanatory information and SOURCES at end of table.

Appendix table 4-19. Master's and doctoral degrees in all fields and in science and engineering, by sex: 1966–1993

Page 3 of 3

Field and year	Master's			Doctorate		
	Men	Women	Percent women	Men	Women	Percent women
All other fields:						
1966	57,604	42,119	42.2	5,217	1,162	18.2
1967	64,497	48,407	42.9	5,948	1,346	18.5
1968	72,198	56,192	43.8	6,677	1,615	19.5
1969	77,699	64,333	45.3	7,574	1,881	19.9
1970	82,173	73,519	47.2	9,123	2,323	20.3
1971	92,474	82,558	47.2	9,886	2,600	20.8
1972	101,364	91,361	47.4	10,563	3,136	22.9
1973	104,767	97,712	48.3	10,817	3,565	24.8
1974	108,816	107,204	49.6	10,551	3,782	26.4
1975	112,705	117,748	51.1	9,881	4,272	30.2
1976	117,753	130,241	52.5	9,887	4,587	31.7
1977	117,311	133,533	53.2	9,083	4,625	33.7
1978	111,674	133,878	54.5	8,354	4,868	36.8
1979	107,158	130,691	54.9	8,174	5,193	38.8
1980	105,155	129,851	55.3	7,798	5,447	41.1
1981	101,926	130,506	56.1	7,408	5,691	43.4
1982	99,384	130,628	56.8	7,093	5,743	44.7
1983	98,396	124,819	55.9	6,829	5,818	46.0
1984	96,965	119,933	55.3	6,682	5,907	46.9
1985	95,484	121,167	55.9	6,509	5,853	47.3
1986	95,321	122,677	56.3	6,324	6,138	49.3
1987	92,896	125,933	57.5	6,357	6,116	49.0
1988	95,583	130,853	57.8	6,410	6,156	49.0
1989	98,554	136,071	58.0	6,190	6,403	50.8
1990	102,795	144,364	58.4	6,464	6,736	51.0
1991	106,454	153,676	59.1	6,560	6,939	51.4
1992	110,142	162,958	59.7	6,839	7,338	51.8
1993	114,299	170,249	59.8	6,860	7,456	52.1

NOTE: Field totals for doctoral degrees presented in this table differ slightly from those in later tables because the field taxonomy used here was revised to match that for bachelor's and master's degrees.

SOURCES: U.S. Department of Education/NCES. HEGIS Earned Degrees Surveys, 1981–85, and IPEDS Completion Surveys, 1987–91; tabulations by National Science Foundation/SRS; and National Science Foundation/SRS. Survey of Earned Doctorates.

Women, Minorities, and Persons With Disabilities in Science and Engineering: 1996

Appendix table 4-20. Master's degrees, by major field group and sex: 1983–1993

Page 1 of 1

Sex and year	All fields	Science and engineering fields									All other fields
		Total	Engineering	Physical sciences	Earth, atmos, and ocean sciences	Mathematical/ computer sciences	Biological/ agricultural	Psychology	Social sciences	
Both sexes:										
1983	290,931	67,733	18,886	3,285	1,959	8,177	9,136	8,439	17,851	223,198
1984	285,462	68,582	20,145	3,544	1,982	8,960	8,702	8,073	17,176	216,880
1985	287,213	70,578	20,972	3,605	2,160	10,004	8,208	8,481	17,148	216,635
1986	289,829	71,840	21,096	3,649	2,234	11,254	8,023	8,363	17,221	217,989
1987	290,532	72,603	22,070	3,574	2,051	11,808	7,775	8,165	17,160	217,929
1988	300,091	73,655	22,726	3,708	1,920	12,600	7,556	7,925	17,220	226,436
1989	311,050	76,425	23,743	3,876	1,819	12,829	7,523	8,652	17,983	234,625
1990	324,947	77,788	23,995	3,805	1,596	13,327	7,527	9,308	18,230	247,159
1991	338,498	78,368	24,013	3,777	1,499	12,956	7,406	9,802	18,915	260,130
1992	354,207	81,107	25,018	3,922	1,425	13,320	7,885	9,852	19,685	273,100
1993	370,973	86,425	27,664	3,965	1,397	14,100	8,112	10,412	20,775	284,548
Men:										
1983	145,114	46,734	17,131	2,600	1,515	5,684	5,703	3,254	10,847	98,380
1984	143,998	47,049	18,045	2,698	1,517	6,185	5,303	2,980	10,321	96,949
1985	143,716	48,247	18,728	2,775	1,639	6,951	4,881	3,064	10,209	95,469
1986	143,932	48,621	18,696	2,736	1,717	7,724	4,679	2,937	10,132	95,311
1987	141,655	48,759	19,300	2,684	1,531	8,011	4,437	2,838	9,958	92,896
1988	145,403	49,820	19,918	2,817	1,433	8,759	4,312	2,599	9,982	95,583
1989	149,399	50,845	20,661	2,836	1,337	8,833	4,210	2,814	10,154	98,554
1990	154,025	51,230	20,726	2,754	1,218	9,176	4,080	3,025	10,251	102,795
1991	156,895	50,441	20,656	2,703	1,116	8,709	3,975	2,994	10,288	106,454
1992	162,299	52,157	21,349	2,834	1,057	9,199	4,227	2,929	10,562	110,142
1993	169,753	55,454	23,570	2,794	1,006	9,773	4,381	2,928	11,002	114,299
Women:										
1983	145,817	20,999	1,755	685	444	2,493	3,433	5,185	7,004	124,818
1984	141,464	21,533	2,100	846	465	2,775	3,399	5,093	6,855	119,931
1985	143,497	22,331	2,244	830	521	3,053	3,327	5,417	6,939	121,166
1986	145,897	23,219	2,400	913	517	3,530	3,344	5,426	7,089	122,678
1987	148,877	23,844	2,770	890	520	3,797	3,338	5,327	7,202	125,033
1988	154,688	23,835	2,808	891	487	3,841	3,244	5,326	7,238	130,853
1989	161,651	25,580	3,082	1,040	482	3,996	3,313	5,838	7,829	136,071
1990	170,922	26,558	3,269	1,051	378	4,151	3,447	6,283	7,979	144,364
1991	181,603	27,927	3,357	1,074	383	4,247	3,431	6,808	8,627	153,676
1992	191,908	28,950	3,669	1,088	368	4,121	3,658	6,923	9,123	162,958
1993	201,220	30,971	4,094	1,171	391	4,327	3,731	7,484	9,773	170,249
Percent women:										
1983	50.1	31.0	9.3	20.9	22.7	30.5	37.6	61.4	39.2	56.0
1984	49.6	31.4	10.4	23.9	23.5	31.0	39.1	63.1	39.9	55.0
1985	50.0	31.6	10.7	23.0	24.1	30.5	40.5	63.9	40.5	56.0
1986	50.3	32.3	11.4	25.0	23.1	31.4	41.7	64.9	41.2	56.0
1987	51.2	32.8	12.6	24.9	25.4	32.2	42.9	65.2	42.0	57.0
1988	51.5	32.4	12.4	24.0	25.4	30.5	42.9	67.2	42.0	58.0
1989	52.0	33.5	13.0	26.8	26.5	31.1	44.0	67.5	43.5	58.0
1990	52.6	34.1	13.6	27.6	23.7	31.1	45.8	67.5	43.8	58.0
1991	53.6	35.6	14.0	28.4	25.6	32.8	46.3	69.5	45.6	59.0
1992	54.2	35.7	14.7	27.7	25.8	30.9	46.4	70.3	46.3	60.0
1993	54.2	35.8	14.8	29.5	28.0	30.7	46.0	71.9	47.0	60.0

SOURCES: Tabulations by National Science Foundation/SRS; data from U.S. Department of Education/NCES Survey of Degrees and Other Formal Awards Conferred, and Completions Survey.

Appendix table 4-21. Master's degrees awarded to U.S. citizens and permanent residents, by field and race/ethnicity of recipient: 1985–1993, selected years

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Field and race/ethnicity	1985	1987	1989	1990	1991	1992	1993
Total, U.S. citizens and permanent residents:							
Total science and engineering	50,751	50,330	51,491	52,120	52,849	54,772	57,720
Sciences	36,291	34,890	35,811	36,530	37,300	38,801	40,345
Natural sciences	19,061	18,900	18,722	18,373	17,935	18,310	18,598
Physical science	4,583	4,271	4,232	3,829	3,562	3,571	3,558
Mathematical science	2,152	2,331	2,309	2,480	2,451	2,684	2,735
Computer science	5,233	5,848	6,061	6,149	6,076	5,992	6,054
Biological science	4,568	4,239	4,169	3,970	3,870	3,822	3,761
Agricultural science	2,525	2,211	1,951	1,945	1,976	2,241	2,490
Social sciences	17,230	15,990	17,089	18,157	19,365	20,491	21,747
Social science	9,074	8,497	9,095	9,632	10,328	11,082	11,682
Psychology	8,156	7,493	7,994	8,525	9,037	9,409	10,065
Engineering	14,460	15,440	15,680	15,590	15,549	15,971	17,375
Non-science and -engineering	203,650	196,609	211,675	218,766	232,411	243,487	252,729
Grand total	254,401	246,939	263,166	270,886	285,260	298,259	310,449
White, non-Hispanic:							
Total science and engineering	43,982	43,360	43,945	44,450	44,513	45,649	47,975
Sciences	31,796	30,523	31,113	31,591	31,878	32,897	34,055
Natural sciences	16,735	16,352	16,080	15,742	15,005	15,136	15,322
Physical science	4,133	3,834	3,766	3,401	3,129	3,067	3,078
Mathematical science	1,873	2,012	2,032	2,169	2,068	2,336	2,354
Computer science	4,303	4,717	4,786	4,851	4,637	4,407	4,464
Biological science	4,081	3,745	3,679	3,501	3,353	3,251	3,144
Agricultural science	2,345	2,044	1,817	1,820	1,818	2,075	2,282
Social sciences	15,061	14,171	15,033	15,849	16,873	17,761	18,733
Social science	7,841	7,473	7,958	8,360	8,900	9,523	9,923
Psychology	7,220	6,698	7,075	7,489	7,973	8,238	8,810
Engineering	12,186	12,837	12,832	12,859	12,635	12,752	13,920
Non-science and -engineering	179,667	173,447	186,377	192,424	203,011	211,413	217,693
Grand total	223,649	216,807	230,322	236,874	247,524	257,062	265,668
Asian:							
Total science and engineering	3,285	3,455	4,100	4,055	4,310	4,763	4,846
Sciences	1,734	1,805	2,108	2,192	2,302	2,540	2,586
Natural sciences	1,229	1,426	1,617	1,629	1,735	1,916	1,918
Physical science	213	227	278	234	251	295	249
Mathematical science	164	183	178	184	189	201	197
Computer science	615	779	894	941	1,014	1,105	1,106
Biological science	179	190	223	225	231	264	305
Agricultural science	58	47	44	45	50	51	61
Social sciences	505	379	491	563	567	624	668
Social science	376	266	360	404	397	441	477
Psychology	129	113	131	159	170	183	191
Engineering	1,551	1,650	1,992	1,863	2,008	2,223	2,260
Non-science and -engineering	4,520	4,674	6,074	5,939	6,760	7,530	8,323
Grand total	7,805	8,129	10,174	9,994	11,070	12,293	13,169

See explanatory information and SOURCES at end of table.

Appendix table 4-21. Master's degrees awarded to U.S. citizens and permanent residents, by field and race/ethnicity of recipient: 1985–1993, selected years

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Field and race/ethnicity	1985	1987	1989	1990	1991	1992	1993
Black, non-Hispanic:							
Total science and engineering	1,742	1,784	1,652	1,847	2,090	2,356	2,554
Sciences	1,412	1,381	1,297	1,460	1,692	1,890	1,990
Natural sciences	523	581	495	527	644	699	716
Physical science	89	79	78	87	73	98	105
Mathematical science	53	73	59	70	100	77	98
Computer science	180	207	198	232	283	316	308
Biological science	151	167	124	110	137	149	135
Agricultural science	50	55	36	28	51	59	70
Social sciences	889	800	802	933	1,048	1,191	1,274
Social science	463	424	407	462	594	660	730
Psychology	426	376	395	471	454	531	544
Engineering	330	403	355	387	398	466	564
Non-science and -engineering	12,218	11,389	11,803	12,626	13,767	15,064	16,343
Grand total	13,960	13,173	13,455	14,473	15,857	17,420	18,897
Hispanic:							
Total science and engineering	1,514	1,584	1,585	1,587	1,736	1,806	2,092
Sciences	1,168	1,072	1,117	1,141	1,268	1,318	1,511
Natural sciences	481	493	444	431	494	503	574
Physical science	127	122	92	98	96	93	114
Mathematical science	55	60	34	51	85	66	78
Computer science	94	123	144	118	128	149	162
Biological science	139	126	126	120	136	146	151
Agricultural science	66	62	48	44	49	49	69
Social sciences	687	579	673	710	774	815	937
Social science	343	308	313	341	383	396	474
Psychology	344	271	360	369	391	419	463
Engineering	346	512	468	446	468	488	581
Non-science and -engineering	6,216	6,197	6,548	6,908	7,948	8,450	9,279
Grand total	7,730	7,781	8,133	8,495	9,684	10,256	11,371
American Indian:							
Total science and engineering	228	147	209	181	200	198	253
Sciences	181	109	176	146	160	156	203
Natural sciences	93	48	86	44	57	56	68
Physical science	21	9	18	9	13	18	12
Mathematical science	7	3	6	6	9	4	8
Computer science	41	22	39	7	14	15	14
Biological science	18	11	17	14	13	12	26
Agricultural science	6	3	6	8	8	7	8
Social sciences	88	61	90	102	103	100	135
Social science	51	26	57	65	54	62	78
Psychology	37	35	33	37	49	38	57
Engineering	47	38	33	35	40	42	50
Non-science and -engineering	1,029	902	873	869	925	1,030	1,091
Grand total	1.257	1,049	1.082	1,050	1,125	1,228	1,344

NOTES: Data on race/ethnicity were collected biennially from 1977 through 1989 and annually thereafter. Data on race/ethnicity of degree recipients are collected on broad fields of study only; therefore, these data could not be adjusted to the exact field taxonomies used by NSF. Racial/ethnic categories as designated on the survey form. These categories include U.S. citizens and foreign citizens on permanent visas (i.e., resident aliens who have been admitted for permanent residency).

SOURCES: Tabulations by National Science Foundation/SRS; data from U.S. Department of Education/NCES biennial data from the HEGIS Earned Degrees Surveys, 1985, and IPEDS Completions Surveys, 1987–93.

Appendix table 4-22. Master's degrees awarded to U.S. citizens and permanent residents, by sex of recipient, field, and race/ethnicity: 1993

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Sex and field	Total	White, non-Hispanic	Asian	Black, non-Hispanic	Hispanic	American Indian
Both sexes:						
Total science and engineering	57,720	47,975	4,846	2,554	2,092	253
Sciences	40,345	34,055	2,586	1,990	1,511	203
Natural sciences	18,598	15,322	1,918	716	574	68
Physical science	3,558	3,078	249	105	114	12
Mathematical science	2,735	2,354	197	98	78	8
Computer science	6,054	4,464	1,106	308	162	14
Biological science	3,761	3,144	305	135	151	26
Agricultural science	2,490	2,282	61	70	69	8
Social sciences	21,747	18,733	668	1,274	937	135
Social science	11,682	9,923	477	730	474	78
Psychology	10,065	8,810	191	544	463	57
Engineering	17,375	13,920	2,260	564	581	50
Non-science and -engineering	252,729	217,693	8,323	16,343	9,279	1,091
Grand total	310,449	265,668	13,169	18,897	11,371	1,344
Men:						
Total science and engineering	35,367	29,493	3,237	1,253	1,255	129
Sciences	20,847	17,716	1,418	846	775	92
Natural sciences	11,750	9,837	1,149	386	341	37
Physical science	2,521	2,229	150	58	76	8
Mathematical science	1,555	1,332	121	48	50	4
Computer science	4,344	3,326	710	193	104	11
Biological science	1,861	1,593	136	47	76	9
Agricultural science	1,469	1,357	32	40	35	5
Social sciences	9,097	7,879	269	460	434	55
Social science	6,344	5,453	219	345	282	45
Psychology	2,753	2,426	50	115	152	10
Engineering	14,520	11,777	1,819	407	480	37
Non-science and -engineering	97,378	84,224	3,888	5,219	3,620	427
Grand total	132,745	113,717	7,125	6,472	4,875	556
Women:						
Total science and engineering	22,353	18,482	1,609	1,301	837	124
Sciences	19,498	16,339	1,168	1,144	736	111
Natural sciences	6,848	5,485	769	330	233	31
Physical science	1,037	849	99	47	38	4
Mathematical science	1,180	1,022	76	50	28	4
Computer science	1,710	1,138	396	115	58	3
Biological science	1,900	1,551	169	88	75	17
Agricultural science	1,021	925	29	30	34	3
Social sciences	12,650	10,854	399	814	503	80
Social science	5,338	4,470	258	385	192	33
Psychology	7,312	6,384	141	429	311	47
Engineering	2,855	2,143	441	157	101	13
Non-science and -engineering	155,351	133,469	4,435	11,124	5,659	664
Grand total	177,704	151,951	6,044	12,425	6,496	788

NOTES: Data on race/ethnicity were collected biennially from 1977 through 1989 and annually thereafter. Data on race/ethnicity of degree recipients are collected on broad fields of study only; therefore, these data could not be adjusted to the exact field taxonomies used by NSF. Racial/ethnic categories as designated on the survey form. These categories include U.S. citizens and foreign citizens on permanent visas (i.e., resident aliens who have been admitted for permanent residency).

SOURCES: Tabulations by National Science Foundation/SRS; data from U.S. Department of Education/NCES biennial data from the HEGIS Earned Degrees Surveys, 1985, and IPEDS Completions Surveys, 1987–93.

Appendix table 4-23. Doctorates, by field and sex: 1983–1993

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Field and sex	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Total, all fields	31,282	31,337	31,298	31,899	32,367	33,499	34,324	36,068	37,517	38,853	39,754
Total science and engineering	18,393	18,514	18,712	19,251	19,706	20,739	21,528	22,672	23,780	24,432	25,184
Sciences	15,612	15,601	15,547	15,877	15,998	16,561	16,991	17,794	18,572	19,015	19,488
Physical sciences	2,802	2,845	2,916	3,090	3,212	3,317	3,244	3,493	3,604	3,751	3,682
Earth, atmos, and ocean sciences	637	614	617	589	628	728	740	769	836	824	790
Mathematical sciences	701	698	688	729	740	749	859	892	1,039	1,058	1,146
Computer sciences	286	295	310	399	450	515	612	705	800	869	878
Agricultural sciences	1,015	997	1,111	997	976	1,015	1,088	1,176	1,074	1,063	969
Biological sciences	3,741	3,880	3,793	3,807	3,839	4,112	4,115	4,327	4,645	4,798	5,090
Psychology	3,347	3,257	3,118	3,126	3,173	3,074	3,208	3,282	3,250	3,264	3,419
Social sciences	3,083	3,015	2,994	3,140	2,980	3,051	3,125	3,150	3,324	3,388	3,514
Engineering	2,781	2,913	3,166	3,376	3,712	4,187	4,543	4,894	5,215	5,439	5,696
Non-science and -engineering	12,889	12,823	12,585	12,646	12,657	12,751	12,790	13,380	13,730	14,399	14,570
Men, all fields	20,749	20,638	20,554	20,594	20,939	21,681	21,812	22,962	23,647	24,433	24,646
Total science and engineering	13,769	13,810	13,900	14,166	14,469	15,157	15,517	16,372	16,957	17,444	17,647
Sciences	11,112	11,048	10,933	11,017	11,003	11,265	11,355	11,909	12,216	12,533	12,472
Physical sciences	2,431	2,446	2,452	2,585	2,686	2,760	2,627	2,840	2,931	2,985	2,903
Earth, atmos, and ocean sciences	540	508	506	489	514	583	590	620	651	631	626
Mathematical sciences	588	583	582	608	615	628	704	734	840	853	882
Computer sciences	250	258	277	351	385	459	504	595	683	749	741
Agricultural sciences	882	864	940	825	805	829	860	929	865	830	741
Biological sciences	2,508	2,665	2,555	2,527	2,479	2,607	2,573	2,713	2,873	2,967	3,040
Psychology	1,750	1,626	1,577	1,527	1,475	1,393	1,408	1,368	1,254	1,335	1,330
Social sciences	2,163	2,098	2,044	2,105	2,044	2,006	2,089	2,110	2,119	2,183	2,209
Engineering	2,657	2,762	2,968	3,151	3,470	3,901	4,168	4,479	4,748	4,933	5,175
Non-science and -engineering	6,980	6,828	6,653	6,426	6,466	6,515	6,288	6,574	6,679	6,967	6,999
Women, all fields	10,533	10,699	10,744	11,305	11,428	11,818	12,512	13,106	13,870	14,420	15,108
Total science and engineering	4,624	4,704	4,812	5,085	5,237	5,582	6,011	6,300	6,823	6,988	7,537
Sciences	4,500	4,553	4,614	4,860	4,995	5,296	5,636	5,885	6,356	6,482	7,016
Physical sciences	371	399	464	505	526	557	617	653	673	766	779
Earth, atmos, and ocean sciences	97	106	111	100	114	145	150	149	185	193	164
Mathematical sciences	113	115	106	121	125	121	155	158	199	205	264
Computer sciences	36	37	33	48	65	56	108	110	117	120	137
Agricultural sciences	133	133	171	172	171	186	228	247	209	233	228
Biological sciences	1,233	1,215	1,238	1,280	1,360	1,505	1,542	1,614	1,772	1,831	2,050
Psychology	1,597	1,631	1,541	1,599	1,698	1,681	1,800	1,914	1,996	1,929	2,089
Social sciences	920	917	950	1,035	936	1,045	1,036	1,040	1,205	1,205	1,305
Engineering	124	151	198	225	242	286	375	415	467	506	521
Non-science and -engineering	5,909	5,995	5,932	6,220	6,191	6,236	6,501	6,806	7,047	7,432	7,571

NOTE: Data differ slightly from other doctoral degree totals because field classifications could not be adjusted to the exact field taxonomies used in other tables.

SOURCE: National Science Foundation/SRS. Survey of Earned Doctorates.

Appendix table 4-24. Doctorates, by field and sex: 1983 and 1993

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Field	1983				1993			
	Total	Men	Women	Percent women	Total	Men	Women	Percent women
Total, all fields	31,282	20,749	10,533	33.7	39,754	24,646	15,108	38.0
Total science and engineering	18,393	13,769	4,624	25.1	25,184	17,647	7,537	29.9
Sciences	15,612	11,112	4,500	28.8	19,488	12,472	7,016	36.0
Physical sciences	2,802	2,431	371	13.2	3,682	2,903	779	21.2
Earth, atmos. and ocean sciences	637	540	97	15.2	790	626	164	20.8
Mathematical sciences	701	588	113	16.1	1,146	882	264	23.0
Computer sciences	286	250	36	12.6	878	741	137	15.6
Agricultural sciences	1,015	882	133	13.1	969	741	228	23.5
Biological sciences	3,741	2,508	1,233	33.0	5,090	3,040	2,050	40.3
Psychology	3,347	1,750	1,597	47.7	3,419	1,330	2,089	61.1
Social sciences	3,083	2,163	920	29.8	3,514	2,209	1,305	37.1
Engineering	2,781	2,657	124	4.5	5,696	5,175	521	9.1
Aerospace engineering	106	104	2	1.9	228	220	8	3.5
Chemical engineering	349	327	22	6.3	624	541	83	13.3
Civil engineering	354	342	12	3.4	563	518	45	8.0
Electrical engineering	436	430	6	1.4	1,353	1,246	107	7.9
Industrial engineering	86	80	6	7.0	236	209	27	11.4
Materials science engineering	157	135	22	14.0	416	349	67	16.1
Mechanical engineering	311	305	6	1.9	901	855	46	5.1
Other engineering	982	934	48	4.9	1,375	1,237	138	10.0
Non-science and -engineering	12,889	6,980	5,909	45.8	14,570	6,999	7,571	52.0

NOTE: Data differ slightly from other doctoral degree totals because field classifications could not be adjusted to the exact field taxonomies used in other tables.

SOURCE: National Science Foundation/SRS. Survey of Earned Doctorates.

Appendix table 4-25. Women as a percentage of all doctorate recipients in science and engineering in top 50 institutions granting doctorates to women, by institution and field: 1993

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	Academic institution	Science and engineering			Science			Engineering		
		Total	Women	Percent women	Total	Women	Percent women	Total	Women	Percent women
1	University of California-Berkeley	607	148	24.4	436	128	29.4	171	20	11.7
2	University of California-Los Angeles	447	139	31.1	358	135	37.7	89	4	4.5
3	Cornell University, all campuses	386	119	30.8	310	114	36.8	76	5	6.6
4	University of Michigan at Ann Arbor	465	116	24.9	272	100	36.8	193	16	8.3
5	University of Pennsylvania	301	116	38.5	252	109	43.3	49	7	14.3
6	University of Wisconsin-Madison	469	115	24.5	356	108	30.3	113	7	6.2
7	Ohio State University, main campus	393	113	28.8	293	110	37.5	100	3	3.0
8	University of Minnesota - Twin Cities	394	112	28.4	307	101	32.9	87	11	12.6
9	University of Illinois at Urbana-Champaign	474	108	22.8	314	96	30.6	160	12	7.5
10	Purdue University, main campus	410	106	25.9	251	90	35.9	159	16	10.1
11	Stanford University	457	105	23.0	260	77	29.6	197	28	14.2
12	Columbia University in the City of New York	290	103	35.5	238	97	40.8	52	6	11.5
13	University of Maryland at College Park	322	100	31.1	232	93	40.1	90	7	7.8
14	University of Texas at Austin	396	97	24.5	259	84	32.4	137	13	9.5
15	Harvard University	313	94	30.0	307	94	30.6	6	0	0.0
16	CUNY Graduate School and University Center	240	92	38.3	220	92	41.8	20	0	0.0
17	Rutgers the State Univ of NJ New Brunswick	241	90	37.3	197	84	42.6	44	6	13.6
18	University of North Carolina at Chapel Hill	237	89	37.6	230	89	38.7	7	0	0.0
19	Pennsylvania State U, main campus	362	88	24.3	223	78	35.0	139	10	7.2
20	Massachusetts Institute of Technology	489	85	17.4	277	59	21.3	212	26	12.3
21	Northwestern University	270	82	30.4	179	67	37.4	91	15	16.5
22	University of Arizona	255	82	32.2	206	78	37.9	49	4	8.2
23	Michigan State University	273	80	29.3	228	77	33.8	45	3	6.7
24	SUNY at Stony Brook, all campuses	222	80	36.0	204	78	38.2	18	2	11.1
25	University of California-Davis	280	80	28.6	234	77	32.9	46	3	6.5
26	Texas A&M University, main campus	355	78	22.0	248	71	28.6	107	7	6.5
27	Johns Hopkins University	220	76	34.5	177	67	37.9	43	9	20.9
28	New York University	169	76	45.0	166	76	45.8	3	0	0.0
29	Yale University	237	76	32.1	225	76	33.8	12	0	0.0
30	SUNY at Buffalo	225	74	32.9	173	69	39.9	52	5	9.6
31	University of Washington	296	74	25.0	227	67	29.5	69	7	10.1
32	University of Southern California	248	70	28.2	160	62	38.8	88	8	9.1
33	University of Massachusetts at Amherst	200	67	33.5	150	62	41.3	50	5	10.0
34	University of Colorado at Boulder	263	63	24.0	178	58	32.6	85	5	5.9
35	Virginia Polytechnic Institute and State Univ	271	63	23.2	164	53	32.3	107	10	9.3
36	California School Prof Psych at Los Angeles	84	61	72.6	84	61	72.6	0	0	0.0
37	University of Chicago	216	61	28.2	216	61	28.2	0	0	0.0
38	University of California-San Diego	232	60	25.9	187	56	29.9	45	4	8.9
39	Indiana University at Bloomington	166	58	34.9	166	58	34.9	0	0	0.0
40	University of Pittsburgh, main campus	168	57	33.9	138	56	40.6	30	1	3.3
41	Princeton University	188	56	29.8	141	49	34.8	47	7	14.9
42	University of Connecticut	141	56	39.7	121	52	43.0	20	4	20.0
43	Iowa State University	251	55	21.9	194	51	26.3	57	4	7.0
44	University of Florida	284	55	19.4	204	51	25.0	80	4	5.0
45	University of Illinois at Chicago	170	55	32.4	136	53	39.0	34	2	5.9
46	Wayne State University	137	55	40.1	116	54	46.6	21	1	4.8
47	University of Virginia, main campus	177	54	30.5	139	50	36.0	38	4	10.5
48	Boston University	155	53	34.2	143	53	37.1	12	0	0.0
49	United States International University	76	53	69.7	76	53	69.7	0	0	0.0
50	University of Georgia	164	50	30.5	164	50	30.5	0	0	0.0

SOURCE: National Science Foundation/SRS. Survey of Earned Doctorates.

Appendix table 4-26. Doctorates awarded to U.S. citizens and permanent residents, by field and race/ethnicity: 1983–1993

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Field and year	Total, U.S. citizens & permanent residents	White, non-Hispanic	Black, non-Hispanic	American Indian	Asian	Hispanic	Other and unknown
Total, all fields:							
1983	25,634	22,250	1,005	82	1,043	608	646
1984	25,251	21,864	1,055	74	1,019	605	634
1985	24,694	21,297	1,043	96	1,069	634	555
1986	24,516	21,225	949	99	1,058	679	506
1987	24,561	21,116	907	115	1,167	708	548
1988	24,912	21,457	966	94	1,235	693	467
1989	25,026	21,568	962	94	1,261	693	448
1990	26,604	22,876	1,047	96	1,305	837	443
1991	27,415	23,173	1,158	132	1,527	867	558
1992	27,953	23,590	1,104	149	1,751	908	451
1993	28,636	23,993	1,275	119	2,009	972	268
Science and engineering:							
1983	14,517	12,670	338	30	780	284	415
1984	14,293	12,417	376	32	776	298	394
1985	14,065	12,166	374	41	809	296	379
1986	14,016	12,148	334	52	813	345	324
1987	14,055	12,051	319	53	924	357	351
1988	14,499	12,454	358	44	916	397	330
1989	14,591	12,500	366	53	981	382	309
1990	15,364	13,168	372	42	1,008	468	306
1991	15,907	13,319	457	56	1,178	492	405
1992	15,942	13,323	403	69	1,336	513	298
1993	16,549	13,718	467	43	1,606	543	172
All other fields:							
1983	11,117	9,580	667	52	263	324	231
1984	10,958	9,447	679	42	243	307	240
1985	10,629	9,131	669	55	260	338	176
1986	10,500	9,077	615	47	245	334	182
1987	10,506	9,065	588	62	243	351	197
1988	10,413	9,003	608	50	319	296	137
1989	10,435	9,068	596	41	280	311	139
1990	11,240	9,708	675	54	297	369	137
1991	11,508	9,854	701	76	349	375	153
1992	12,011	10,267	701	80	415	395	153
1993	12,087	10.275	808	76	403	429	96

See explanatory information and SOURCE at end of table.

Appendix table 4-26. Doctorates awarded to U.S. citizens and permanent residents, by field and race/ethnicity: 1983–1993

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Field and year	U.S. citizens	White, non-Hispanic	Black, non-Hispanic	American Indian	Asian	Hispanic	Other and unknown
Total, all fields:							
1983	24,359	21,705	922	81	492	539	620
1984	24,027	21,350	953	74	512	534	604
1985	23,370	20,763	912	96	516	561	522
1986	23,083	20,629	823	99	530	572	430
1987	22,983	20,462	768	115	542	617	479
1988	23,290	20,783	814	94	614	595	390
1989	23,400	20,892	821	94	626	581	386
1990	24,906	22,169	898	96	641	721	381
1991	25,559	22,413	1,003	130	786	731	496
1992	25,975	22,876	961	149	837	778	374
1993	26,386	23,202	1,106	119	891	834	234
Science and engineering:							
1983	13,614	12,306	297	29	346	239	397
1984	13,454	12,091	316	32	385	257	373
1985	13,134	11,821	294	41	374	250	354
1986	13,022	11,746	270	52	400	279	275
1987	12,966	11,611	245	53	446	308	303
1988	13,369	12,002	272	44	454	331	266
1989	13,467	12,048	297	53	489	313	267
1990	14,167	12,692	290	42	488	390	265
1991	14,623	12,835	362	56	597	410	363
1992	14,560	12,848	319	69	643	433	248
1993	14,913	13,191	374	43	713	446	146
All other fields:							
1983	10,745	9,399	625	52	146	300	223
1984	10,573	9,259	637	42	127	277	231
1985	10,236	8,942	618	55	142	311	168
1986	10,061	8,883	553	47	130	293	155
1987	10,017	8,851	523	62	96	309	176
1988	9,921	8,781	542	50	160	264	124
1989	9,933	8,844	524	41	137	268	119
1990	10,739	9,477	608	54	153	331	116
1991	10,936	9,578	641	74	189	321	133
1992	11,415	10,028	642	80	194	345	126
1993	11,473	10,011	732	76	178	388	88

See explanatory information and SOURCE at end of table.

Appendix table 4-26. Doctorates awarded to U.S. citizens and permanent residents, by field and race/ethnicity: 1983–1993

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Field and year	Permanent residents	White, non-Hispanic	Black, non-Hispanic	American Indian	Asian	Hispanic	Other and unknown
Total, all fields:							
1983	1,275	545	83	1	551	69	26
1984	1,224	514	102	0	507	71	30
1985	1,324	534	131	0	553	73	33
1986	1,433	596	126	0	528	107	76
1987	1,578	654	139	0	625	91	69
1988	1,622	674	152	0	621	98	77
1989	1,626	676	141	0	635	112	62
1990	1,698	707	149	0	664	116	62
1991	1,856	760	155	2	741	136	62
1992	1,978	714	143	0	914	130	77
1993	2,250	791	169	0	1118	138	34
Science and engineering:							
1983	903	364	41	1	434	45	18
1984	839	326	60	0	391	41	21
1985	931	345	80	0	435	46	25
1986	994	402	64	0	413	66	49
1987	1,089	440	74	0	478	49	48
1988	1,130	452	86	0	462	66	64
1989	1,124	452	69	0	492	69	42
1990	1,197	476	82	0	520	78	41
1991	1,284	484	95	0	581	82	42
1992	1,382	475	84	0	693	80	50
1993	1,636	527	93	0	893	97	26
All other fields:							
1983	372	181	42	0	117	24	8
1984	385	188	42	0	116	30	9
1985	393	189	51	0	118	27	8
1986	439	194	62	0	115	41	27
1987	489	214	65	0	147	42	21
1988	492	222	66	0	159	32	13
1989	502	224	72	0	143	43	20
1990	501	231	67	0	144	38	21
1991	572	276	60	2	160	54	20
1992	596	239	59	0	221	50	27
1993	614	264	76	0	225	41	8

NOTE: Data differ slightly from other doctoral degree totals because these were derived from the CASPAR data analysis system which treats missing data for citizenship differently.

SOURCE: National Science Foundation/SRS. Survey of Earned Doctorates.

Appendix table 4-27. Number of doctoral degrees, by field, race/ethnicity of recipient, and citizenship status: 1985–1993, selected years

Page 1 of 3

Field, race/ethnicity, and citizenship status	1985	1987	1989	1990	1991	1992	1993
Total, all recipients:							
Total science and engineering	18,936	19,894	21,731	22,868	24,018	24,676	25,438
Sciences	15,770	16,182	17,188	17,974	18,803	19,237	19,742
Natural sciences	9,435	9,845	10,656	11,360	11,997	12,363	12,554
Physical science[1]	3,533	3,840	3,984	4,262	4,440	4,575	4,472
Mathematical science	688	740	859	892	1,039	1,058	1,146
Computer science	310	450	612	705	800	869	878
Biological science	3,793	3,839	4,115	4,327	4,645	4,798	5,090
Agricultural science	1,111	976	1,086	1,174	1,073	1,063	968
Social sciences	6,335	6,337	6,532	6,614	6,806	6,874	7,188
Social science	3,217	3,164	3,324	3,332	3,556	3,610	3,769
Psychology	3,118	3,173	3,208	3,282	3,250	3,264	3,419
Engineering	3,166	3,712	4,543	4,894	5,215	5,439	5,696
Non-science and -engineering	12,362	12,473	12,593	13,200	13,499	14,177	14,316
Grand total	31,298	32,367	34,324	36,068	37,517	38,853	39,754
White, non-Hispanic:							
Total science and engineering	12,172	12,064	12,517	13,218	13,352	13,353	13,767
Sciences	10,984	10,604	10,787	11,371	11,509	11,468	11,737
Natural sciences	6,433	6,218	6,492	6,817	6,893	6,830	6,846
Physical science[1]	2,331	2,353	2,327	2,509	2,526	2,463	2,372
Mathematical science	350	319	369	375	422	425	479
Computer science	177	230	320	343	355	379	411
Biological science	2,915	2,761	2,906	2,980	3,044	3,070	3,146
Agricultural science	660	555	570	610	546	493	438
Social sciences	4,551	4,386	4,295	4,554	4,616	4,638	4,891
Social science	1,961	1,868	1,836	1,902	1,950	1,993	2,068
Psychology	2,590	2,518	2,459	2,652	2,666	2,645	2,823
Engineering	1,188	1,460	1,730	1,847	1,843	1,885	2,030
Non-science and -engineering	9,141	9,074	9,086	9,737	9,871	10,292	10,326
Grand total	21,313	21,138	21,603	22,955	23,223	23,645	24,093
Asian:							
Total science and engineering	849	940	994	1,052	1,218	1,352	1,646
Sciences	543	609	632	677	802	897	1,104
Natural sciences	403	445	484	506	614	705	855
Physical science[1]	174	166	182	184	200	258	293
Mathematical science	34	41	24	28	57	51	79
Computer science	17	27	53	52	66	86	81
Biological science	152	173	200	207	262	272	372
Agricultural science	26	38	25	35	29	38	30
Social sciences	140	164	148	171	188	192	249
Social science	96	116	93	118	126	136	175
Psychology	44	48	55	53	62	56	74
Engineering	306	331	362	375	416	455	542
Non-science and -engineering	267	253	284	309	357	420	412
Grand total	1,116	1,193	1,278	1,361	1,575	1,772	2,058

See explanatory information and SOURCES at end of table.

Appendix table 4-27. Number of doctoral degrees, by field, race/ethnicity of recipient, and citizenship status: 1985–1993, selected years

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Field, race/ethnicity, and citizenship status	1985	1987	1989	1990	1991	1992	1993
Black, non-Hispanic:							
Total science and engineering	375	320	376	379	459	406	472
Sciences	341	295	341	339	404	357	421
Natural sciences	110	109	115	106	131	117	150
Physical science[1]	31	22	35	33	34	32	45
Mathematical science	7	11	8	4	11	4	8
Computer science	3	2	1	1	8	5	6
Biological science	53	60	57	51	60	61	74
Agricultural science	16	14	14	17	18	15	17
Social sciences	231	186	226	233	273	240	271
Social science	126	93	129	117	144	137	152
Psychology	105	93	97	116	129	103	119
Engineering	34	25	35	40	55	49	51
Non-science and -engineering	670	593	597	680	706	705	815
Grand total	1,045	913	973	1,059	1,165	1,111	1,287
Hispanic:							
Total science and engineering	297	363	385	471	496	522	546
Sciences	275	328	338	417	435	451	481
Natural sciences	125	157	174	214	215	232	251
Physical science[1]	36	62	69	86	81	89	94
Mathematical science	12	11	11	11	9	12	16
Computer science	6	4	4	5	12	8	7
Biological science	59	64	71	89	97	102	114
Agricultural science	12	16	19	23	16	21	20
Social sciences	150	171	164	203	220	219	230
Social science	81	76	71	94	98	83	97
Psychology	69	95	93	109	122	136	133
Engineering	22	35	47	54	61	71	65
Non-science and -engineering	343	353	314	371	377	397	430
Grand total	640	716	699	842	873	919	976
American Indian:							
Total science and engineering	41	53	53	42	56	69	43
Sciences	40	46	46	38	50	58	41
Natural sciences	21	23	27	13	28	30	19
Physical science[1]	4	7	16	4	13	13	9
Mathematical science	0	0	0	1	0	2	1
Computer science	0	3	2	0	1	2	1
Biological science	13	11	7	4	10	13	7
Agricultural science	4	2	2	4	4	0	1
Social sciences	19	23	19	25	22	28	22
Social science	9	7	8	7	9	13	7
Psychology	10	16	11	18	13	15	15
Engineering	1	7	7	4	6	11	2
Non-science and -engineering	55	62	41	54	76	81	76
Grand total	96	115	94	96	132	150	119

See explanatory information and SOURCES at end of table.

Appendix table 4-27. Number of doctoral degrees, by field, race/ethnicity of recipient, and citizenship status: 1985–1993, selected years

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Field, race/ethnicity, and citizenship status	1985	1987	1989	1990	1991	1992	1993
U.S. citizens and permanent residents, total:							
Total science and engineering	13,734	13,740	14,325	15,162	15,581	15,702	16,474
Sciences	12,183	11,882	12,144	12,842	13,200	13,231	13,784
Natural sciences	7,092	6,952	7,292	7,656	7,881	7,914	8,121
Physical science[1]	2,576	2,610	2,629	2,816	2,854	2,855	2,813
Mathematical science	403	382	412	419	499	494	583
Computer science	203	266	380	401	442	480	506
Biological science	3,192	3,069	3,241	3,331	3,473	3,518	3,713
Agricultural science	718	625	630	689	613	567	506
Social sciences	5,091	4,930	4,852	5,186	5,319	5,317	5,663
Social science	2,273	2,160	2,137	2,238	2,327	2,362	2,499
Psychology	2,818	2,770	2,715	2,948	2,992	2,955	3,164
Engineering	1,551	1,858	2,181	2,320	2,381	2,471	2,690
Non-science and -engineering	10,476	10,335	10,322	11,151	11,387	11,895	12,059
Grand total	24,210	24,075	24,647	26,313	26,968	27,597	28,533
Nonresident alien[2]:							
Total science and engineering	4,048	4,468	5,391	6,571	7,642	8,092	8,111
Sciences	2,629	2,936	3,451	4,294	5,008	5,349	5,328
Natural sciences	1,845	2,149	2,499	3,232	3,782	4,089	4,056
Physical science[1]	739	923	1,012	1,244	1,442	1,582	1,497
Mathematical science	238	302	346	424	506	511	517
Computer science	89	143	178	271	340	365	349
Biological science	424	492	608	853	1,059	1,159	1,246
Agricultural science	355	289	355	440	435	472	447
Social sciences	784	787	952	1,062	1,226	1,260	1,272
Social science	703	702	846	945	1,093	1,104	1,124
Psychology	81	85	106	117	133	156	148
Engineering	1,419	1,532	1,940	2,277	2,634	2,743	2,783
Non-science and -engineering	1,180	1,142	1,255	1,522	1,667	1,858	1,812
Grand total	5,228	5,610	6,646	8,093	9,309	9,950	9,923
Unknown race/ethnicity or citizenship:							
Total science and engineering	1,154	1,686	2,015	1,135	795	882	853
Sciences	958	1,364	1,593	838	595	657	630
Natural sciences	498	744	865	472	334	360	377
Physical science[1]	218	307	343	202	144	138	162
Mathematical science	47	56	101	49	34	53	46
Computer science	18	41	54	33	18	24	23
Biological science	177	278	266	143	113	121	131
Agricultural science	38	62	101	45	25	24	15
Social sciences	460	620	728	366	261	297	253
Social science	241	302	341	149	136	144	146
Psychology	219	318	387	217	125	153	107
Engineering	196	322	422	297	200	225	223
Non-science and -engineering	706	996	1,016	527	445	424	445
Grand total	1,860	2,682	3,031	1,662	1,240	1,306	1,298

[1] In this report, "physical science" includes earth, atmospheric, and ocean science, as well as physics, astronomy, and chemistry.

[2] Nonresident aliens include foreign citizens on temporary visas only.

SOURCE: National Science Foundation/SRS, Survey of Earned Doctorates.

Appendix table 4-28. Top 50 institutions awarding doctorates in science and engineering to minorities with U.S. citizenship, by race/ethnicity: 1993

Page 1 of 1

Academic institution	Total U.S. citizens	White	Minority race/ethnicity: Total	Black	American Indian	Asian	Hispanic	Other or unknown
Total, all institutions	14,913	13,191	1,576	374	43	713	446	146
1 University of California-Berkeley	408	346	61	7	0	42	12	1
2 University of California-Los Angeles	271	207	61	5	0	40	16	3
3 Stanford University	290	233	56	7	1	45	3	1
4 Massachusetts Institute of Technology	217	183	28	3	1	19	5	6
5 University of Michigan at Ann Arbor	275	248	27	8	0	11	8	0
6 CUNY Graduate School and University Center	125	97	25	8	0	10	7	3
7 Harvard University	188	158	25	6	0	14	5	5
8 University of Pennsylvania	201	175	23	7	0	8	8	3
9 California School Prof Psych at Los Angeles	78	56	22	10	0	6	6	0
10 Ohio State University, Main Campus	189	167	22	2	1	10	9	0
11 University of California-Irvine	96	68	22	2	0	15	5	6
12 University of Colorado at Boulder	175	152	22	7	0	7	8	1
13 University of Maryland at College Park	170	147	22	9	1	8	4	1
14 University of Southern California	121	95	22	1	0	14	7	4
15 Georgia Institute of Technology, Main Campus	110	89	20	4	0	10	6	1
16 Princeton University	115	94	20	3	0	15	2	1
17 Purdue University, Main Campus	185	165	20	1	2	12	5	0
18 University of California-Davis	160	138	20	0	0	17	3	2
19 University of California-San Diego	144	123	20	3	0	13	4	1
20 University of Illinois at Urbana-Champaign	247	227	20	2	0	13	5	0
21 University of Wisconsin-Madison	274	252	20	0	1	13	6	2
22 Cornell University, all campuses	212	192	19	2	0	10	7	1
23 Texas A&M University Main Campus	186	167	19	2	0	8	9	0
24 University of Texas at Austin	217	198	19	2	1	7	9	0
25 University of Washington	194	171	18	3	0	13	2	5
26 Northwestern University	159	138	17	1	0	13	3	4
27 University of Florida	156	139	17	8	1	3	5	0
28 Yale University	156	137	17	2	0	12	3	2
29 Michigan State University	147	130	16	4	0	7	5	1
30 Pennsylvania State U, Main Campus	191	175	16	3	0	6	7	0
31 University of Minnesota - Twin Cities	233	209	16	2	2	10	2	8
32 Columbia University in the City of New York	166	149	14	2	0	7	5	3
33 New York University	115	98	14	2	1	5	6	3
34 Rutgers the State Univ of NJ New Brunswick	122	106	14	3	0	5	6	2
35 University of North Carolina at Chapel Hill	190	176	14	8	3	1	2	0
36 North Carolina State University at Raleigh	134	121	13	3	0	5	5	0
37 University of California-Santa Barbara	101	87	13	1	0	5	7	1
38 University of Illinois at Chicago	89	76	13	3	0	6	4	0
39 University of PR Rio Piedras Campus	13	0	13	0	0	0	13	0
40 University of California-Riverside	63	51	12	0	1	8	3	0
41 University of Chicago	145	133	12	3	0	7	2	0
42 University of Miami	44	31	12	0	0	2	10	1
43 Vanderbilt University	78	65	11	4	0	6	1	2
44 Boston University	81	70	10	5	0	2	3	1
45 Johns Hopkins University	136	112	10	0	0	7	3	14
46 SUNY at Buffalo	114	104	10	5	1	3	1	0
47 University of California-San Francisco	50	40	10	0	0	7	3	0
48 University of Hawaii at Manoa	52	38	10	0	0	10	0	4
49 University of Massachusetts at Amherst	124	113	10	5	0	2	3	1
50 Duke University[1]	113	104	9	2	0	4	3	0

[1] Indiana University at Bloomington, Temple University, University of Georgia, and Washington State University ranked the same total number of minorities.

NOTES: Institutions are ranked by total doctorates awarded to minorities. Data differ slightly from other doctoral degree totals because these were derived from the CASPAR data analysis system which treats missing data for citizenship differently.

SOURCE: National Science Foundation/SRS. Survey of Earned Doctorates.

Appendix 4-29. Recipients of science and engineering doctorates, by major field and disability status: 1993

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Field	All doctorate recipients		Doctorate recipients with disabilities	
	Total	Percent	Total	Percent
Total science and engineering	25,184	100.0	329	100.0
Sciences	19,488	77.4	284	86.3
Physics/astronomy	1,543	6.1	16	4.9
Chemistry	2,139	8.5	31	9.4
Earth, atmos. and ocean sciences	790	3.1	4	1.2
Mathematics	1,146	4.6	10	3.0
Computer/information sciences	878	3.5	9	2.7
Agricultural sciences	969	3.8	11	3.3
Biological sciences	5,090	20.2	67	20.4
Psychology	3,419	13.6	71	21.6
Social sciences	3,514	14.0	65	19.8
Engineering	5,696	22.6	45	13.7

NOTES: Data differ slightly from other doctoral degree totals because field classifications could not be adjusted to the exact field taxonomies used in other tables. All citizenship groups are included.

SOURCE: National Science Foundation/SRS. Survey of Earned Doctorates.

Appendix 4-30. Recipients of science and engineering doctorates reporting a disability, by type of disability: 1993

Page 1 of 1

Type of disability	Total science and engineering	Science		Engineering	
		Total	Percent	Total	Percent
Total with disability	329	284	100.0	45	100.0
Visual	84	68	23.9	16	35.6
Mobility	57	52	18.3	5	11.1
Auditory	51	43	15.1	8	17.8
Vocal	7	7	2.5	0	0.0
Other	93	84	29.6	9	20.0
Unknown	37	30	10.6	7	15.6

NOTES: Data differ slightly from other doctoral degree totals because field classifications could not be adjusted to the exact field taxonomies used in other tables. All citizenship groups are included.

SOURCE: National Science Foundation/SRS. Survey of Earned Doctorates.

Women, Minorities, and Persons With Disabilities in Science and Engineering: 1996

Appendix 4-31. Recipients of science and engineering doctorates, by disability status and race/ethnicity: 1993

Page 1 of 1

Disability status	Total	White	Asian	Black	Hispanic	American Indian	Other/ Unknown
Total scientists and engineers with a disability	253	229	8	7	7	0	2
Scientists with a disability	226	208	7	5	5	0	1
Percent	89.3	90.8	87.5	71.4	71.4		50.0
Engineers with a disability	27	21	1	2	2	0	1
Percent	10.7	9.2	12.5	28.6	28.6		50.0
Total scientists and engineers without a disability	13,925	12,367	683	339	419	39	78
Scientists without a disability	11,786	10,546	472	303	365	37	63
Percent	84.6	85.3	69.1	89.4	87.1	94.9	80.8
Engineers without a disability	2,139	1,821	211	36	54	2	15
Percent	15.4	14.7	30.9	10.6	12.9	5.1	19.2

NOTES: Data are for U.S. citizens only. Data differ slightly from other doctoral degree totals because field classifications could not be adjusted to the exact field taxonomies used in other tables.

SOURCE: National Science Foundation/SRS. Survey of Earned Doctorates.

Appendix 4-32. Years between bachelor's and doctoral degrees for scientists and engineers, by disability status and sex: 1993

Page 1 of 1

Years	Total Ph.D.s			Persons with disabilities		
	Total	Women	Men	Total	Women	Men
Total time, bachelor's to Ph.D. (number):						
1 to 5 years	2,542	745	1,797	38	12	26
6 to 10 years	12,893	3,668	9,225	133	37	96
11 to 15 years	5,367	1,573	3,794	63	18	45
16 to 20 years	1,967	676	1,291	46	14	32
21 or more years	1,277	599	678	45	25	20
Total known responses	24,046	7,261	16,785	325	106	219
Unknown responses	1,138	276	862	4	1	3
Total Ph.D.s	25,184	7,537	17,647	329	107	222
Total time, bachelor's to Ph.D. (percent):						
1 to 5 years	10.1	9.9	10.2	11.6	11.2	11.7
6 to 10 years	51.2	48.7	52.3	40.4	34.6	43.2
11 to 15 years	21.3	20.9	21.5	19.1	16.8	20.3
16 to 20 years	7.8	9.0	7.3	14.0	13.1	14.4
21 or more years	5.1	7.9	3.8	13.7	23.4	9.0
Unknown responses	4.5	3.7	4.9	1.2	0.9	1.4

NOTE: Data differ slightly from other doctoral degree totals because field classifications could not be adjusted to the exact field taxonomies used in other tables.

SOURCE: National Science Foundation/SRS. Survey of Earned Doctorates.

Appendix table 4-33. Science and engineering postdoctoral appointees in doctorate-granting institutions, by sex and field: 1988–1993

Page 1 of 3

Sex and field	1988	1989	1990	1991	1992	1993
Both sexes:						
Total science and engineering	19,670	20,846	21,754	22,811	23,813	24,560
Sciences	17,985	18,934	19,814	20,558	21,468	22,123
Physical sciences	5,185	5,355	5,565	5,693	5,757	5,648
Astronomy	147	186	184	210	206	219
Chemistry	3,421	3,457	3,630	3,647	3,564	3,567
Physics	1,584	1,583	1,723	1,813	1,948	1,823
Physical sciences, n.e.c.	33	29	28	23	39	39
Earth, atmospheric, and ocean sciences	493	450	590	622	686	757
Atmospheric sciences	71	58	57	59	64	81
Geosciences	273	265	342	368	395	418
Oceanography	116	107	170	161	186	205
Earth, atmospheric, and ocean sciences, n.e.c.	33	20	21	34	41	53
Mathematical sciences	284	224	248	206	201	220
Computer sciences	91	78	71	120	144	168
Agricultural sciences	464	519	529	570	635	717
Biological sciences	10,651	11,406	11,911	12,467	13,166	13,703
Psychology	498	536	464	504	520	530
Social sciences	319	366	436	376	359	380
Economics	29	61	94	79	71	84
Political science	49	41	66	78	49	35
Sociology	74	75	96	91	75	77
Anthropology	56	74	64	51	59	52
Linguistics	36	30	38	14	26	29
History of science	16	12	18	19	17	26
Social sciences, n.e.c.	59	73	60	44	62	77
Engineering	1,685	1,912	1,940	2,253	2,345	2,437
Aerospace engineering	48	38	67	77	92	116
Chemical engineering	423	466	551	578	533	525
Civil engineering	203	182	168	185	187	188
Electrical engineering	186	193	241	339	313	382
Mechanical engineering	216	302	219	323	349	355
Materials engineering	325	323	365	394	450	405
Industrial engineering	32	32	6	27	38	63
Engineering, n.e.c.	252	376	323	330	383	403

See explanatory information and SOURCES at end of table.

Appendix table 4-33. Science and engineering postdoctoral appointees in doctorate-granting institutions, by sex and field: 1988–1993

Page 2 of 3

Sex and field	1988	1989	1990	1991	1992	1993
Women:						
Total science and engineering	4,907	5,309	5,632	5,951	6,428	6,759
Sciences	4,736	5,134	5,427	5,715	6,179	6,475
Physical sciences	713	749	794	836	836	843
Astronomy	19	26	25	34	25	35
Chemistry	563	582	603	640	644	633
Physics	126	137	162	158	162	169
Physical sciences, n.e.c.	5	4	4	4	5	6
Earth, atmospheric, and ocean sciences	85	70	94	111	153	162
Atmospheric sciences	5	2	6	10	13	13
Geosciences	48	43	61	57	79	75
Oceanography	24	21	25	34	51	62
Earth, atmospheric, and ocean sciences, n.e.c.	8	4	2	10	10	12
Mathematical sciences	37	28	30	29	26	33
Computer sciences	11	14	9	20	32	29
Agricultural sciences	110	134	138	132	159	177
Biological sciences	3,448	3,800	3,987	4,204	4,599	4,861
Psychology	216	209	221	237	249	232
Social sciences	116	130	154	146	125	138
Economics	3	10	14	13	15	14
Political science	15	14	21	33	18	10
Sociology	34	34	39	42	30	38
Anthropology	19	29	27	24	23	29
Linguistics	15	12	15	5	10	14
History of science	5	2	9	9	6	8
Social sciences, n.e.c.	25	29	29	20	23	25
Engineering	171	175	205	236	249	284
Aerospace engineering	3	3	4	4	4	11
Chemical engineering	53	46	81	92	68	78
Civil engineering	19	29	14	22	21	17
Electrical engineering	16	13	14	18	32	33
Mechanical engineering	18	14	16	22	20	18
Materials engineering	36	36	43	41	53	52
Industrial engineering	4	6	1	2	3	13
Engineering, n.e.c.	22	28	32	35	48	62

See explanatory information and SOURCES at end of table.

Appendix table 4-33. Science and engineering postdoctoral appointees in doctorate-granting institutions, by sex and field: 1988–1993

Page 3 of 3

Sex and field	1988	1989	1990	1991	1992	1993
Men:						
Total science and engineering	14,763	15,537	16,122	16,860	17,385	17,801
Sciences	13,249	13,800	14,387	14,843	15,289	15,648
Physical sciences	4,472	4,606	4,771	4,857	4,921	4,805
Astronomy	128	160	159	176	181	184
Chemistry	2,858	2,875	3,027	3,007	2,920	2,934
Physics	1,458	1,546	1,561	1,655	1,786	1,654
Physical sciences, n.e.c.	28	25	24	19	34	33
Earth, atmospheric, and ocean sciences	408	380	496	511	533	595
Atmospheric sciences	66	56	51	49	51	68
Geosciences	225	222	281	311	316	343
Oceanography	92	86	145	127	135	143
Earth, atmospheric, and ocean sciences, n.e.c.	25	16	19	24	31	41
Mathematical sciences	247	196	218	177	175	187
Computer sciences	80	64	62	100	112	139
Agricultural sciences	354	385	391	438	476	540
Biological sciences	7,203	7,606	7,924	8,263	8,567	8,842
Psychology	282	327	243	267	271	298
Social science	203	236	282	230	234	242
Economics	26	51	80	66	56	70
Political science	34	27	45	45	31	25
Sociology	40	41	57	49	45	39
Anthropology	37	45	37	27	36	23
Linguistics	21	18	23	9	16	15
History of science	11	10	9	10	11	18
Social sciences, n.e.c.	34	44	31	24	39	52
Engineering	1,514	1,737	1,735	2,017	2,096	2,153
Aerospace engineering	45	35	63	73	88	105
Chemical engineering	370	420	470	486	465	447
Civil engineering	184	153	154	163	166	171
Electrical engineering	170	180	227	321	281	349
Mechanical engineering	198	288	203	301	329	337
Materials engineering	289	287	322	353	397	353
Industrial engineering	28	26	5	25	35	50
Engineering, n.e.c.	230	348	291	295	335	341

SOURCE: National Science Foundation/SRS. Survey of Graduate Students and Postdoctorates in Science and Engineering, 1993.

Appendix table 5-1. Scientists and engineers in the labor force, by occupation, sex, and highest degree: 1993

Page 1 of 1

Field of occupation	Total		Bachelor's		Master's		Doctorate		Other	
	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women
Total science and engineering	2,493,000	720,000	1,421,000	358,000	677,000	244,000	364,000	108,000	31,000	10,000
Computer/mathematical sciences	667,000	296,000	423,000	204,000	193,000	81,000	46,000	10,000	4,000	-
Computer science	592,000	255,000	405,000	192,000	165,000	59,000	19,000	3,000	3,000	-
Mathematical science	30,000	18,000	11,000	8,000	11,000	8,000	7,000	3,000	-	-
Computer/mathematics teachers	45,000	23,000	7,000	5,000	17,000	14,000	21,000	4,000	-	-
Life sciences	212,000	104,000	68,000	37,000	41,000	32,000	87,000	30,000	17,000	4,000
Agricultural/food science	34,000	10,000	19,000	6,000	8,000	2,000	7,000	2,000	-	-
Biological sciences	110,000	69,000	28,000	25,000	21,000	18,000	55,000	22,000	6,000	3,000
Environmental science	21,000	3,000	15,000	2,000	5,000	1,000	1,000	-	-	-
Life science teachers	48,000	21,000	6,000	4,000	7,000	9,000	24,000	7,000	11,000	1,000
Physical sciences	212,000	55,000	81,000	25,000	56,000	15,000	75,000	14,000	1,000	1,000
Chemistry	80,000	28,000	40,000	16,000	16,000	6,000	24,000	6,000	-	1,000
Earth/geology/oceanography	57,000	10,000	27,000	4,000	20,000	4,000	10,000	2,000	-	-
Physics and astronomy	32,000	3,000	6,000	-	9,000	1,000	17,000	2,000	-	-
Other physical science	11,000	4,000	5,000	1,000	4,000	2,000	1,000	1,000	-	-
Physical science teachers	32,000	9,000	3,000	3,000	7,000	2,000	22,000	4,000	-	-
Social sciences	167,000	161,000	18,000	21,000	62,000	85,000	83,000	51,000	4,000	4,000
Economics	23,000	7,000	5,000	3,000	10,000	4,000	7,000	1,000	-	-
Political science	5,000	3,000	2,000	2,000	2,000	-	1,000	1,000	-	-
Psychology	68,000	100,000	4,000	10,000	27,000	58,000	35,000	29,000	2,000	2,000
Sociology/anthropology	6,000	8,000	1,000	3,000	3,000	3,000	2,000	2,000	-	-
Other social science	12,000	14,000	4,000	3,000	5,000	8,000	3,000	1,000	-	1,000
Social science teachers	54,000	30,000	2,000	2,000	15,000	11,000	35,000	17,000	2,000	-
Engineering	1,236,000	105,000	832,000	70,000	325,000	31,000	73,000	4,000	5,000	-
Aero engineering	80,000	6,000	49,000	4,000	25,000	2,000	5,000	-	-	-
Chemical engineering	64,000	10,000	39,000	5,000	17,000	4,000	7,000	-	-	-
Civil engineering	166,000	15,000	117,000	11,000	44,000	4,000	4,000	-	1,000	-
Electrical engineering	333,000	17,000	222,000	11,000	94,000	5,000	16,000	1,000	2,000	-
Industrial engineering	60,000	6,000	45,000	5,000	15,000	1,000	1,000	-	-	-
Mechanical engineering	228,000	12,000	171,000	8,000	49,000	3,000	6,000	1,000	1,000	-
Other engineering	276,000	36,000	186,000	24,000	73,000	11,000	18,000	1,000	1,000	-
Engineering teachers	[illegible],000	3,000	3,000	1,000	7,000	1,000	16,000	1,000	-	-

KEY: - = fewer than 500 estimated

NOTES: Teachers include only postsecondary teachers. Because of rounding, details may not add to totals.

SOURCE: National Science Foundation/SRS. 1993 National Survey of College Graduates.

Appendix table 5-2. Scientists and engineers in the labor force, by sex, occupation, highest degree, and race/ethnicity: 1993

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Sex and field of occupation	Total					Bachelor's				
	White	Asian	Black	Hispanic	American Indian	White	Asian	Black	Hispanic	American Indian
Total science and engineering	2,718,000	286,000	111,000	90,000	6,000	1,536,000	113,000	73,000	52,000	4,000
Computer/mathematical sciences	808,000	86,000	41,000	25,000	1,000	538,000	39,000	31,000	18,000	1,000
Computer science	713,000	76,000	35,000	21,000	1,000	514,000	38,000	28,000	16,000	1,000
Mathematical science	39,000	4,000	3,000	2,000	-	15,000	1,000	2,000	1,000	-
Computer/mathematics teachers	56,000	6,000	3,000	2,000	-	9,000	1,000	1,000	1,000	-
Life sciences	265,000	31,000	10,000	9,000	-	92,000	5,000	4,000	3,000	-
Agricultural/food science	40,000	3,000	1,000	1,000	-	24,000	1,000	1,000	-	-
Biological sciences	143,000	23,000	6,000	6,000	-	45,000	3,000	3,000	2,000	-
Environmental science	23,000	-	-	1,000	-	16,000	-	-	-	-
Life science teachers	59,000	5,000	3,000	2,000	-	8,000	1,000	1,000	-	-
Physical sciences	226,000	26,000	7,000	7,000	1,000	92,000	6,000	5,000	3,000	1,000
Chemistry	87,000	14,000	4,000	2,000	-	46,000	4,000	3,000	1,000	-
Earth/geology/oceanography	61,000	3,000	-	2,000	-	29,000	-	-	1,000	-
Physics and astronomy	30,000	5,000	-	1,000	-	6,000	-	-	-	-
Other physical science	12,000	1,000	1,000	-	-	6,000	-	1,000	-	-
Physical science teachers	35,000	3,000	1,000	2,000	-	5,000	1,000	-	1,000	-
Social sciences	291,000	10,000	16,000	10,000	1,000	31,000	1,000	4,000	2,000	-
Economics	25,000	2,000	1,000	1,000	-	6,000	-	1,000	-	-
Political science	6,000	1,000	-	-	-	3,000	-	-	-	-
Psychology	152,000	2,000	7,000	5,000	1,000	11,000	-	2,000	1,000	-
Sociology/anthropology	12,000	-	1,000	1,000	-	3,000	-	1,000	-	-
Other social science	22,000	1,000	2,000	1,000	-	6,000	-	1,000	-	-
Social science teachers	73,000	5,000	5,000	2,000	-	3,000	-	-	-	-
Engineering	1,128,000	132,000	37,000	39,000	3,000	783,000	62,000	29,000	26,000	2,000
Aero engineering	74,000	7,000	2,000	2,000	-	47,000	3,000	1,000	1,000	-
Chemical engineering	61,000	9,000	2,000	2,000	-	39,000	4,000	1,000	1,000	-
Civil engineering	149,000	22,000	4,000	7,000	-	108,000	12,000	3,000	4,000	-
Electrical engineering	285,000	43,000	11,000	11,000	1,000	196,000	21,000	9,000	7,000	-
Industrial engineering	56,000	5,000	4,000	2,000	-	42,000	2,000	3,000	2,000	-
Mechanical engineering	204,000	23,000	6,000	6,000	1,000	158,000	12,000	5,000	4,000	-
Other engineering	276,000	20,000	9,000	8,000	1,000	189,000	8,000	7,000	6,000	1,000
Engineering teachers	23,000	4,000	1,000	1,000	-	3,000	-	-	-	-
Men:										
Total science and engineering	2,126,000	220,000	73,000	68,000	5,000	1,246,000	82,000	48,000	41,000	3,000
Computer/mathematical sciences	569,000	56,000	23,000	17,000	1,000	239,000	30,000	18,000	8,000	-
Life sciences	182,000	18,000	6,000	6,000	-	83,000	13,000	4,000	4,000	-
Physical sciences	182,000	20,000	5,000	5,000	1,000	73,000	3,000	3,000	2,000	-
Social sciences	147,000	6,000	8,000	4,000	1,000	15,000	-	1,000	1,000	-
Engineering	1,045,000	120,000	31,000	36,000	2,000	727,000	55,000	24,000	24,000	2,000
Women:										
Total science and engineering	591,000	66,000	38,000	22,000	2,000	290,000	30,000	25,000	11,000	1,000
Computer/mathematical sciences	239,000	30,000	18,000	8,000	-	371,000	23,000	17,000	12,000	1,000
Life sciences	83,000	13,000	4,000	4,000	-	61,000	2,000	3,000	2,000	-
Physical sciences	44,000	7,000	2,000	2,000	-	19,000	3,000	2,000	1,000	-
Social sciences	143,000	4,000	8,000	5,000	1,000	17,000	1,000	3,000	1,000	-
Engineering	82,000	13,000	6,000	3,000	-	56,000	7,000	5,000	2,000	-

See explanatory information and SOURCE at end of table.

Appendix table 5-2. Scientists and engineers in the labor force, by sex, occupation, highest degree, and race/ethnicity: 1993

Page 2 of 3

Sex and field of occupation	Master's					Doctorate				
	White	Asian	Black	Hispanic	American Indian	White	Asian	Black	Hispanic	American Indian
Total science and engineering	756,000	110,000	26,000	26,000	1,000	391,000	59,000	11,000	11,000	1,000
Computer/mathematical sciences	222,000	37,000	9,000	6,000	-	45,000	9,000	1,000	1,000	-
Computer science	179,000	33,000	6,000	5,000	-	17,000	4,000	-	-	-
Mathematical science	16,000	1,000	1,000	1,000	-	7,000	1,000	1,000	-	-
Computer/mathematics teachers	27,000	2,000	1,000	1,000	-	20,000	3,000	-	1,000	-
Life sciences	59,000	9,000	3,000	2,000	-	97,000	15,000	2,000	3,000	-
Agricultural/food science	9,000	1,000	-	-	-	7,000	1,000	-	-	-
Biological sciences	30,000	6,000	2,000	1,000	-	61,000	12,000	1,000	2,000	-
Environmental science	6,000	-	-	-	-	1,000	-	-	-	-
Life science teachers	14,000	1,000	1,000	1,000	-	27,000	2,000	1,000	1,000	-
Physical sciences	61,000	7,000	1,000	2,000	-	72,000	13,000	1,000	2,000	-
Chemistry	17,000	3,000	1,000	-	-	23,000	6,000	-	1,000	-
Earth/geology/oceanography	22,000	1,000	-	1,000	-	11,000	1,000	-	-	-
Physics and astronomy	8,000	1,000	-	-	-	15,000	3,000	-	-	-
Other physical science	5,000	1,000	-	-	-	1,000	1,000	-	-	-
Physical science teachers	8,000	1,000	-	-	-	22,000	2,000	1,000	1,000	-
Social sciences	131,000	5,000	7,000	5,000	-	121,000	4,000	5,000	3,000	-
Economics	12,000	1,000	-	1,000	-	7,000	1,000	-	-	-
Political science	2,000	-	-	-	-	2,000	-	-	-	-
Psychology	77,000	1,000	4,000	3,000	-	60,000	1,000	1,000	2,000	-
Sociology/anthropology	6,000	-	-	-	-	3,000	-	-	-	-
Other social science	12,000	1,000	1,000	-	-	4,000	-		-	-
Social science teachers	23,000	1,000	1,000	1,000	-	45,000	3,000	3,000	1,000	-
Engineering	284,000	53,000	8,000	11,000	1,000	56,000	18,000	1,000	1,000	-
Aero engineering	23,000	3,000	1,000	1,000	-	4,000	1,000	-	-	-
Chemical engineering	16,000	3,000	1,000	1,000	-	6,000	2,000	-	-	-
Civil engineering	36,000	8,000	1,000	2,000	-	3,000	1,000	-	-	-
Electrical engineering	76,000	18,000	2,000	3,000	-	12,000	4,000	-	-	-
Industrial engineering	13,000	2,000	-	1,000	-	1,000	-	-	-	-
Mechanical engineering	41,000	9,000	1,000	1,000	-	4,000	2,000	-	-	-
Other engineering	72,000	9,000	2,000	2,000	-	14,000	4,000	-	-	-
Engineering teachers	7,000	1,000	-	-	-	13,000	3,000	1,000	1,000	-
Men:										
Total science and engineering	554,000	86,000	16,000	19,000	1,000	300,000	49,000	8,000	7,000	-
Computer/mathematical sciences	158,000	25,000	5,000	5,000	-	37,000	8,000	1,000	1,000	-
Life sciences	35,000	4,000	1,000	1,000	-	72,000	11,000	2,000	2,000	-
Physical sciences	47,000	6,000	1,000	2,000	-	62,000	10,000	1,000	1,000	-
Social sciences	54,000	3,000	3,000	2,000	-	74,000	3,000	4,000	2,000	-
Engineering	260,000	48,000	6,000	10,000	1,000	54,000	17,000	1,000	1,000	-
Women:										
Total science and engineering	202,000	24,000	10,000	7,000	-	91,000	10,000	3,000	3,000	-
Computer/mathematical sciences	64,000	12,000	4,000	2,000	-	8,000	1,000	-	-	-
Life sciences	24,000	4,000	2,000	1,000	-	25,000	4,000	1,000	1,000	-
Physical sciences	14,000	1,000	-	-	-	10,000	3,000	-	1,000	-
Social sciences	76,000	2,000	3,000	3,000	-	47,000	1,000	1,000	1,000	-
Engineering	24,000	5,000	1,000	1,000	-	2,000	1,000	-	-	-

See explanatory information and SOURCE at end of table.

Appendix table 5-2. Scientists and engineers in the labor force, by sex, occupation, highest degree, and race/ethnicity: 1993

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Sex and field of occupation	Other				
	White	Asian	Black	Hispanic	American Indian
Total science and engineering	34,000	4,000	1,000	1,000	-
Computer/mathematical sciences	3,000	-	1,000	-	-
Computer science	3,000	-	-	-	-
Mathematical science	-	-	-	-	-
Computer/mathematics teachers	-	-	-	-	-
Life sciences	17,000	3,000	-	1,000	-
Agricultural/food science	-	-	-	-	-
Biological sciences	7,000	2,000	-	-	-
Environmental science	-	-	-	-	-
Life science teachers	10,000	1,000	-	-	-
Physical sciences	1,000	-	-	-	-
Chemistry	1,000	-	-	-	-
Earth/geology/oceanography	-	-	-	-	-
Physics and astronomy	-	-	-	-	-
Other physical science	-	-	-	-	-
Physical science teachers	-	-	-	-	-
Social sciences	8,000	-	-	-	-
Economics	-	-	-	-	-
Political science	-	-	-	-	-
Psychology	4,000	-	-	-	-
Sociology/anthropology	-	-	-	-	-
Other social science	1,000	-	-	-	-
Social science teachers	2,000	-	-	-	-
Engineering	5,000	1,000	-	1,000	-
Aero engineering	-	-	-	-	-
Chemical engineering	-	-	-	-	-
Civil engineering	1,000	-	-	-	-
Electrical engineering	1,000	-	-	-	-
Industrial engineering	-	-	-	-	-
Mechanical engineering	1,000	-	-	-	-
Other engineering	1,000	-	-	-	-
Engineering teachers	-	-	-	-	-
Men:					
Total science and engineering	26,000	3,000	1,000	1,000	-
Computer/mathematical sciences	3,000	-	1,000	-	-
Life sciences	14,000	2,000	-	1,000	-
Physical sciences	1,000	-	-	-	-
Social sciences	4,000	-	-	-	-
Engineering	5,000	-	-	1,000	-
Women:					
Total science and engineering	8,000	1,000	-	-	-
Computer/mathematical sciences	-	-	-	-	-
Life sciences	3,000	1,000	-	-	-
Physical sciences	1,000	-	-	-	-
Social sciences	4,000	-	-	-	-
Engineering	-	-	-	-	-

KEY: - = fewer than 500 estimated

NOTES: Teachers include only postsecondary teachers. Because of rounding, details may not add to totals.

SOURCE: National Science Foundation/SRS. 1993 National Survey of College Graduates.

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Appendix table 5-3. Scientists and engineers in the labor force, by occupation, highest degree, and disability status: 1993

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Field of occupation	Total		Bachelor's		Master's		Doctorate		Other	
	Persons without disabilities	Persons with disabilities	Persons without disabilities	Persons with disabilities	Persons without disabilities	Persons with disabilities	Persons without disabilities	Persons with disabilities	Persons without disabilities	Persons with disabilities
Total science and engineering	3,036,000	175,000	1,676,000	101,000	875,000	45,000	446,000	26,000	38,000	2,000
Computer/mathematical sciences	911,000	50,000	594,000	33,000	260,000	14,000	53,000	3,000	4,000	-
Computer science	803,000	43,000	566,000	31,000	213,000	11,000	21,000	1,000	3,000	-
Mathematical science	45,000	2,000	18,000	1,000	18,000	1,000	9,000	-	-	-
Computer/mathematics teachers	63,000	5,000	10,000	2,000	29,000	2,000	23,000	1,000	1,000	-
Life sciences	300,000	15,000	99,000	5,000	69,000	4,000	112,000	6,000	20,000	1,000
Agricultural/food science	43,000	2,000	25,000	1,000	10,000	1,000	8,000	-	-	-
Biological sciences	171,000	8,000	51,000	2,000	38,000	2,000	73,000	3,000	9,000	-
Environmental science	22,000	2,000	15,000	2,000	6,000	-	1,000	-	-	-
Life science teachers	65,000	4,000	9,000	-	16,000	1,000	29,000	2,000	11,000	1,000
Physical sciences	254,000	12,000	101,000	5,000	68,000	3,000	84,000	4,000	1,000	-
Chemistry	103,000	5,000	53,000	3,000	20,000	1,000	29,000	1,000	1,000	-
Earth/geology/oceanography	64,000	3,000	29,000	1,000	23,000	1,000	11,000	1,000	-	-
Physics and astronomy	35,000	1,000	7,000	-	10,000	-	18,000	1,000	-	-
Other physical science	14,000	-	6,000	-	6,000	-	2,000	-	-	-
Physical science teachers	39,000	2,000	6,000	-	9,000	1,000	24,000	1,000	-	-
Social sciences	308,000	20,000	37,000	3,000	139,000	8,000	125,000	9,000	8,000	-
Economics	29,000	1,000	7,000	-	13,000	-	8,000	-	-	-
Political science	7,000	-	3,000	-	2,000	-	2,000	-	-	-
Psychology	157,000	11,000	12,000	2,000	80,000	5,000	61,000	3,000	4,000	-
Sociology/anthropology	13,000	1,000	4,000	-	6,000	-	3,000	1,000	-	-
Other social science	24,000	1,000	7,000	-	12,000	1,000	4,000	-	1,000	-
Social science teachers	79,000	6,000	4,000	-	25,000	1,000	48,000	4,000	2,000	-
Engineering	1,262,000	78,000	846,000	56,000	339,000	17,000	72,000	5,000	6,000	-
Aero engineering	80,000	5,000	49,000	4,000	26,000	1,000	5,000	-	-	-
Chemical engineering	68,000	5,000	42,000	3,000	19,000	1,000	7,000	-	-	-
Civil engineering	170,000	11,000	120,000	8,000	45,000	3,000	4,000	-	1,000	-
Electrical engineering	331,000	19,000	218,000	14,000	95,000	4,000	15,000	1,000	2,000	-
Industrial engineering	64,000	3,000	47,000	2,000	16,000	1,000	1,000	-	-	-
Mechanical engineering	227,000	12,000	169,000	10,000	50,000	2,000	7,000	-	1,000	-
Other engineering	294,000	20,000	197,000	13,000	79,000	5,000	17,000	2,000	1,000	-
Engineering teachers	27,000	2,000	3,000	1,000	8,000	-	16,000	1,000	-	-

KEY: - = fewer than 500 estimated

NOTES: Teachers include only postsecondary teachers. Because of rounding, details may not add to totals.

SOURCE: National Science Foundation/SRS. 1993 National Survey of College Graduates.

Appendix table 5-4. Scientists and engineers in the labor force, by sex, race/ethnicity, disability status, and year of degree: 1993

Page 1 of 1

Sex, race/ethnicity, and disability status	Before 1970	1970 to 1979	1980 to 1989	1990 or later
Total	564,000	915,000	1,445,000	287,000
Sex:				
Men	499,000	748,000	1,051,000	194,000
Women	64,000	168,000	394,000	93,000
Race/ethnicity:				
White	497,000	794,000	1,203,000	224,000
Asian	44,000	70,000	131,000	41,000
Black	12,000	30,000	59,000	10,000
Hispanic	10,000	20,000	49,000	11,000
American Indian	1,000	1,000	3,000	1,000
Disability status:				
Persons without disabilities	511,000	859,000	1,390,000	276,000
Persons with disabilities	53,000	56,000	55,000	11,000

NOTE: Because of rounding, details may not add to totals.

SOURCE: National Science Foundation/SRS. 1993 National Survey of College Graduates.

Appendix table 5-5. Number of doctoral scientists and engineers in the U.S. labor force, by field of doctorate and sex: 1993

Page 1 of 1

Field of doctorate	All	Men	Women	Percent women
Total science and engineering	470,500	375,210	95,290	20.3
Sciences	394,070	302,060	92,010	23.3
Computer/mathematical sciences	28,260	24,830	3,430	12.1
Computer/information sciences	5,190	4,400	790	15.2
Mathematical science	23,070	20,430	2,640	11.4
Life sciences	126,460	93,900	32,560	25.7
Agricultural/food science	15,390	13,430	1,950	12.7
Biological/health science	107,180	76,880	30,310	28.3
Environmental science	3,880	3,580	300	7.7
Physical sciences	100,660	90,500	10,160	10.1
Chemistry, except biochemistry	52,710	45,900	6,800	12.9
Geology/oceanography	12,890	11,550	1,340	10.4
Physics/astronomy	33,930	32,120	1,810	5.3
Other (including earth)	1,140	930	210	18.4
Social sciences	138,690	92,830	45,860	33.1
Economics	19,690	17,110	2,580	13.1
Political science	14,580	11,930	2,650	18.2
Psychology	71,950	42,750	29,200	40.6
Sociology/anthropology	20,110	12,650	7,460	37.1
Other	12,350	8,380	3,960	32.1
Engineering	76,440	73,160	3,280	4.3
Aerospace/aeronautical	3,120	3,090	--	--
Chemical	11,340	10,820	520	4.6
Civil	7,100	6,870	230	3.2
Electrical/computer	19,780	19,090	690	3.5
Industrial	1,950	1,680	270	13.8
Mechanical	9,560	9,300	260	2.7
Other	23,580	22,300	1,280	5.4

KEY: -- = fewer than 50 estimated

NOTE: Because of rounding, details may not add to totals.

SOURCE: National Science Foundation/SRS. 1993 Survey of Doctorate Recipients.

Appendix table 5-6. Number of 1992 bachelor's science and engineering graduates, by field of degree, sex, employment status, and graduate school status: 1993

Page 1 of 1

Field of degree and sex	Total graduates	Employment status					Graduate school status		
		Full-time employed in field[1]	Full-time employed outside field	Part-time employed	Not employed but seeking work	Not employed and not seeking work	Part-time student	Full-time student	Nonstudent
Total science and engineering	330,900	148,400	63,700	27,100	11,200	8,600	28,100	71,900	231,000
Men	184,000	88,800	33,800	12,600	6,700	3,600	14,300	38,500	131,200
Women	146,900	59,600	29,900	14,600	4,500	5,000	13,800	33,300	99,800
Agricultural sciences	4,900	2,700	500	300	200	100	200	1,000	3,700
Men	3,100	1,900	300	200	200	-	100	500	2,500
Women	1,800	900	200	100	100	100	100	500	1,200
Biological/life sciences	47,200	15,100	6,600	5,300	1,000	1,800	3,600	17,400	26,200
Men	23,900	7,000	3,800	2,000	500	700	1,400	10,000	12,500
Women	23,400	8,000	2,800	3,300	500	1,100	2,200	7,500	13,700
Computer and information sciences	25,700	18,600	2,800	1,500	1,200	200	2,200	1,400	22,100
Men	16,800	12,200	1,700	900	700	-	1,200	1,200	14,400
Women	8,900	6,400	1,100	500	500	200	1,000	200	7,700
Mathematics	14,100	6,400	1,800	1,600	400	400	1,200	3,500	9,400
Men	6,900	2,800	1,100	800	200	300	400	1,600	4,900
Women	7,100	3,600	600	800	100	200	800	1,800	4,500
Physical sciences	17,600	7,000	1,800	1,000	300	300	900	7,200	9,500
Men	12,100	4,600	1,200	800	200	200	600	5,100	6,400
Women	5,500	2,300	600	200	100	100	300	2,100	3,100
Psychology	61,000	22,700	13,400	6,600	2,400	2,300	6,400	13,600	41,000
Men	17,500	5,900	4,200	1,900	1,300	300	1,400	3,900	12,200
Women	43,600	16,800	9,200	4,700	1,100	2,000	5,000	9,800	28,800
Social sciences	102,600	38,100	30,900	8,600	3,800	2,800	8,200	18,400	76,000
Men	53,700	21,900	16,100	4,100	1,900	1,500	4,600	8,100	41,000
Women	48,900	16,100	14,800	4,500	1,900	1,300	3,600	10,300	35,000
Engineering	57,800	37,900	5,800	2,300	2,000	600	5,400	9,300	43,100
Men	50,100	32,400	5,300	1,900	1,800	600	4,600	8,200	37,300
Women	7,600	5,500	500	400	200	-	700	1,100	5,800

[1] Current work is "closely related" or "somewhat related" to degree field.

KEY: - = fewer than 500 estimated

NOTES: Employment status excludes full-time students. Because of rounding, details may not add to totals.

SOURCE: National Science Foundation/SRS. 1993 National Survey of Recent College Graduates.

Appendix table 5-7. Number of unemployed 1992 bachelor's science and engineering graduates, by reason for not working and sex: 1993

Page 1 of 1

Reason for not working	Total	Men	Women
Total not working	19,800	10,300	9,500
Reason for not working:			
Layoff	1,600	900	700
Student	2,100	1,100	1,000
Family responsibility	2,800	100	2,800
Illness or disability	800	600	200
No suitable job	7,500	4,300	3,200
Did not want/need to work	2,600	1,600	1,000
Other reason	4,800	2,900	1,900

NOTES: Because respondents may indicate multiple reasons and because of rounding, details may not add to totals. Table does not include full-time graduate students.

SOURCE: National Science Foundation/SRS. 1993 National Survey of Recent College Graduates.

Appendix table 5-8. Number of employed 1992 bachelor's science and engineering graduates, by occupation and sex: 1993

Page 1 of 1

Field of occupation	Total	Men		Women	
		Number	Percent	Number	Percent
Total employed graduates	239,200	135,100	100.0	104,100	100.0
Total scientists and engineers	65,700	47,000	34.8	18,800	18.1
Computer and mathematical scientists	18,800	12,900	9.5	5,900	5.7
Life and related scientists	5,400	2,800	2.1	2,700	2.6
Physical scientists	5,600	3,900	2.9	1,700	1.6
Social and related scientists	5,800	2,300	1.7	3,400	3.3
Engineers	30,100	25,100	18.6	5,100	4.9
Total non-science and -engineering	173,400	88,000	65.1	85,400	82.0
Managers and related	23,900	15,200	11.3	8,700	8.4
Health and related	6,200	1,800	1.3	4,400	4.2
Educators other than S&E postsecondary	16,800	7,100	5.3	9,700	9.3
Social services and related	14,000	3,300	2.4	10,700	10.3
Technicians, computer programmers	18,500	11,700	8.7	6,800	6.5
Sales and marketing	28,300	15,600	11.5	12,700	12.2
Other occupations	65,700	33,300	24.6	32,400	31.1

NOTES: Does not include full-time graduate students. A more detailed breakdown of the "other occupations" category reveals that approximately two-thirds are in service (food service, protective service, and "other" service) or clerical occupations. Approximately equal numbers of men and women are in service occupations, but women predominate in the clerical occupations.

Because of rounding, details may not add to totals.

SOURCE: National Science Foundation/SRS. 1993 National Survey of Recent College Graduates.

Appendix table 5-9. Labor force participation and unemployment rates for doctoral scientists and engineers, by year of doctorate and sex: 1993

Page 1 of 1

Year of doctorate and sex	Total	Labor force	Working for pay or profit	Labor force participation rate	Unemployment rate
Total	513,460	470,500	462,870	91.6	1.6
Men	410,190	375,210	369,260	91.5	1.6
Women	103,270	95,290	93,610	92.3	1.8
Total, 1991–1992 graduates	41,910	41,080	40,260	98.0	2.0
Men	28,090	27,820	27,240	99.0	2.1
Women	13,820	13,260	13,020	95.9	1.8
Total, 1985–1990 graduates	106,220	104,120	102,690	98.0	1.4
Men	72,930	72,340	71,450	99.2	1.2
Women	33,290	31,780	31,240	95.5	1.7
Total, 1980–1984 graduates	80,310	78,440	77,240	97.7	1.5
Men	58,880	58,330	57,440	99.1	1.5
Women	21,430	20,110	19,810	93.8	1.5
Total, 1970–1979 graduates	158,870	153,560	151,230	96.7	1.5
Men	133,310	129,760	127,860	97.3	1.5
Women	25,570	23,800	23,380	93.1	1.8
Total, 1960–1969 graduates	88,560	76,200	74,890	86.0	1.7
Men	81,760	70,840	69,620	86.6	1.7
Women	6,800	5,370	5,260	79.0	2.0
Total, pre-1960 graduates	37,580	17,100	16,560	45.5	3.2
Men	35,220	16,140	15,660	45.8	3.0
Women	2,370	960	900	40.5	6.3

NOTE: Because of rounding, details may not add to totals.

SOURCE: National Science Foundation/SRS. 1993 Survey of Doctorate Recipients.

Appendix table 5-10. Doctoral scientists and engineers, by occupation, sex, and employment status: 1993

Page 1 of 1

Field of occupation and sex	Total	Full-time employed in field[*]		Full-time employed outside field		Part-time employed		Not employed		Not in labor force	
		Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Total science and engineering:											
Men	410,210	326,460	79.6	26,080	6.4	16,730	4.1	5,960	1.5	34,980	8.5
Women	103,270	75,860	73.5	4,940	4.8	12,810	12.4	1,680	1.6	7,980	7.7
Physical sciences:											
Men	100,830	75,250	74.6	9,410	9.3	4,040	4.0	1,800	1.8	10,330	10.2
Women	11,340	7,890	69.6	970	8.6	980	8.6	320	2.8	1,180	10.4
Computer/math:											
Men	26,070	22,320	85.6	1,500	5.8	740	2.8	280	1.1	1,230	4.7
Women	3,650	2,850	78.1	170	4.7	360	9.9	40	1.1	230	6.3
Agriculture:											
Men	15,370	11,660	75.9	690	4.5	820	5.3	270	1.8	1,930	12.6
Women	2,080	1,650	79.3	120	5.8	160	7.7	20	1.0	130	6.3
Biosciences:											
Men	84,370	68,510	81.2	4,750	5.6	2,590	3.1	1,030	1.2	7,490	8.9
Women	33,290	25,290	76.0	1,640	4.9	2,850	8.6	520	1.6	2,990	9.0
Environmental:											
Men	4,020	3,200	79.6	260	6.5	120	3.0	--	--	440	10.9
Women	300	250	83.3	--	--	--	--	30	10.0	20	6.7
Psychology:											
Men	46,060	37,590	81.6	1,570	3.4	2,970	6.4	620	1.3	3,310	7.2
Women	31,030	21,870	70.5	670	2.2	6,360	20.5	310	1.0	1,820	5.9
Social sciences:											
Men	55,490	43,890	79.1	2,940	5.3	2,530	4.6	730	1.3	5,400	9.7
Women	18,080	13,210	73.1	1,290	7.1	1,810	10.0	340	1.9	1,430	7.9
Engineering:											
Men	78,090	64,030	82.0	4,960	6.4	2,930	3.8	1,230	1.6	4,940	6.3
Women	3,470	2,850	82.1	80	2.3	270	7.8	80	2.3	190	5.5

[*] Current work is "closely related" or "somewhat related" to degree.

KEY: -- = fewer than 50 estimated

NOTE: Because of rounding, details may not add to totals.

SOURCE: National Science Foundation/SRS. 1993 Survey of Doctorate Recipients.

Appendix table 5-11. Doctoral scientists and engineers who are employed part-time, by year of doctorate, reason for part-time status, and sex: 1993

Page 1 of 1

Year of doctorate and reason for part-time status	All	Men	Women
Total	29,540	16,730	12,810
Retired or semi-retired	10,500	9,440	1,060
Student	770	430	350
Family responsibilities	7,190	860	6,330
Chronic illness/disability	570	270	300
Suitable job not available	7,920	4,700	3,220
Didn't need or want to work	8,710	4,020	4,700
Other	2,220	1,400	820
Total, 1991–1992 graduates	2,300	930	1,370
Retired or semi-retired	---	---	---
Student	160	90	70
Family responsibilities	730	110	630
Chronic illness/disability	60	---	60
Suitable job not available	1,270	740	530
Didn't need or want to work	420	---	390
Other	230	100	140
Total, 1985–1990 graduates	5,530	1,150	4,380
Retired or semi-retired	150	90	60
Student	300	120	180
Family responsibilities	2,750	120	2,630
Chronic illness/disability	---	---	---
Suitable job not available	1,560	600	960
Didn't need or want to work	1,690	200	1,480
Other	430	200	230
Total, 1980–1984 graduates	3,780	1,210	2,570
Retired or semi-retired	140	---	110
Student	120	90	20
Family responsibilities	1,620	160	1,460
Chronic illness/disability	100	---	100
Suitable job not available	1,270	730	540
Didn't need or want to work	1,270	250	1,020
Other	300	170	130
Total, Pre-1970 graduates	17,930	13,430	4,480
Retired or semi-retired	10,160	9,300	860
Student	160	90	70
Family responsibilities	2,090	480	1,610
Chronic illness/disability	380	270	100
Suitable job not available	3,820	2,630	1,190
Didn't need or want to work	5,340	3,530	1,810
Other	1,250	930	320

KEY: --- = Less than 50 weighted cases

NOTE: Because respondents may indicate multiple reasons and because of rounding, details may not add to totals.

SOURCE: National Science Foundation/SRS. 1993 Survey of Doctorate Recipients.

Appendix table 5-12. Employment status of doctoral scientists and engineers, by sex and dependent children: 1993

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Employment status	Men			Women		
	Children under 18	No children under 18	Total	Children under 18	No children under 18	Total
Total labor force	170,600	203,900	374,500	37,900	57,200	95,100
Percent	45.6	54.4	100.0	39.9	60.1	100.0
Unemployed	1,700	3,600	5,300	800	700	1,500
Percent	1.0	1.8	1.4	2.1	1.2	1.6
Total employed	168,900	200,300	369,300	37,100	56,500	93,600
Percent	45.8	54.2	100.0	39.6	60.4	100.0
Full-time	165,700	18,680	352,500	29,500	51,300	80,800
Percent	98.1	93.3	95.5	79.5	90.8	86.3
Part-time	3,300	13,500	16,700	7,600	5,200	12,800
Percent	1.9	6.7	4.5	20.5	9.2	13.7

NOTES: Because of rounding, details may not add to totals.
"Unemployed" includes only those who are not currently employed and who are seeking employment.

SOURCE: National Science Foundation/SRS. 1993 Survey of Doctorate Recipients.

Appendix table 5-13. Labor force participation and unemployment rates for doctoral scientists and engineers, by field of doctorate and sex: 1993

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Field of doctorate and sex	Total	Labor force	Working for pay or profit	Labor force participation rate	Unemployment rate
Total science and engineering	513,460	470,500	462,870	91.6	1.6
Men	410,190	375,210	369,260	91.5	1.6
Women	103,270	95,290	93,610	92.3	1.8
Sciences	431,890	394,070	387,740	91.2	1.6
Men	332,090	302,060	297,330	91.0	1.6
Women	99,800	92,010	90,410	92.2	1.7
Computer and mathematical sciences	29,720	28,260	27,940	95.1	1.1
Men	26,070	24,830	24,560	95.2	1.1
Women	3,660	3,430	3,390	93.7	1.5
Life and related sciences	139,460	126,460	124,590	90.7	1.5
Men	103,750	93,900	92,600	90.5	1.4
Women	35,700	32,560	31,990	91.2	1.8
Physical and related sciences	112,170	100,660	98,540	89.7	2.1
Men	100,830	90,500	88,700	89.8	2.0
Women	11,340	10,160	9,840	89.6	3.2
Social and related sciences	150,540	138,690	136,680	92.1	1.4
Men	101,450	92,830	91,480	91.5	1.5
Women	49,090	45,860	45,200	93.4	1.4
Engineering	81,570	76,440	75,120	93.7	1.7
Men	78,100	73,160	71,930	93.7	1.7
Women	3,470	3,280	3,200	94.5	2.4

NOTE: Because of rounding, details may not add to totals.

SOURCE: National Science Foundation/SRS. 1993 Survey of Doctorate Recipients.

Women, Minorities, and Persons With Disabilities in Science and Engineering: 1996

Appendix table 5-14. Bachelor's scientists and engineers in the labor force, by employment sector, sex, race/ethnicity, and disability status: 1993

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Employment sector	Total	Sex		Race/ethnicity					Disability status	
		Men	Women	White	Asian	Black	Hispanic	American Indian	Persons without disabilities	Persons with disabilities
Total	1,723,000	1,374,000	349,000	1,493,000	107,000	70,000	50,000	4,000	1,627,000	96,000
2-year college	17,000	10,000	6,000	14,000	1,000	1,000	1,000	-	15,000	2,000
4-year college	67,000	41,000	26,000	53,000	7,000	4,000	3,000	-	63,000	4,000
Other education	14,000	8,000	6,000	11,000	1,000	1,000	-	-	13,000	1,000
Government	276,000	226,000	50,000	227,000	19,000	19,000	10,000	1,000	260,000	16,000
Private, not-for-profit	43,000	26,000	18,000	38,000	2,000	1,000	1,000	-	40,000	3,000
Private, for-profit	1,239,000	1,010,000	229,000	1,088,000	74,000	42,000	33,000	2,000	1,174,000	65,000
Self-employed	53,000	44,000	9,000	48,000	2,000	2,000	1,000	-	48,000	5,000
Other	14,000	11,000	4,000	13,000	1,000	-	-	-	13,000	1,000
	Percent distribution									
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
2-year college	1.0	0.7	1.7	0.9	0.9	1.4	2.0	-	0.9	2.1
4-year college	3.9	3.0	7.4	3.5	6.5	5.7	6.0	-	3.9	4.2
Other education	0.8	0.6	1.7	0.7	0.9	1.4	-	-	0.8	1.0
Government	16.0	16.4	14.3	15.2	17.8	27.1	20.0	25.0	16.0	16.7
Private, not-for-profit	2.5	1.9	5.2	2.5	1.9	1.4	2.0	-	2.5	3.1
Private, for-profit	71.9	73.5	65.6	72.9	69.2	60.0	66.0	50.0	72.2	67.7
Self-employed	3.1	3.2	2.6	3.2	1.9	2.9	2.0	-	3.0	5.2
Other	0.8	0.8	1.1	0.9	0.9	-	-	-	0.8	1.0

KEY: - = fewer than 500 estimated/percent distribution not available

NOTE: Because of rounding, details may not add to totals.

SOURCE: National Science Foundation/SRS. 1993 National Survey of College Graduates.

Appendix table 5-15. Master's scientists and engineers in the labor force, by employment sector, sex, race/ethnicity, and disability status: 1993

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Employment sector	Total	Sex		Race/ethnicity					Disability status	
		Men	Women	White	Asian	Black	Hispanic	American Indian	Persons without disabilities	Persons with disabilities
Total	889,000	653,000	236,000	732,000	105,000	26,000	25,000	2,000	847,000	43,000
2-year college	39,000	23,000	16,000	35,000	1,000	2,000	1,000	-	36,000	3,000
4-year college	112,000	71,000	41,000	86,000	19,000	3,000	4,000	-	106,000	6,000
Other education	31,000	13,000	18,000	27,000	1,000	2,000	2,000	-	29,000	2,000
Government	126,000	98,000	28,000	103,000	12,000	7,000	4,000	-	117,000	9,000
Private, not-for-profit	36,000	17,000	19,000	32,000	2,000	1,000	1,000	-	34,000	2,000
Private, for-profit	502,000	409,000	93,000	410,000	68,000	10,000	13,000	1,000	482,000	19,000
Self-employed	38,000	18,000	20,000	35,000	1,000	-	1,000	-	36,000	2,000
Other	6,000	5,000	1,000	5,000	1,000	-	-	-	6,000	-
	Percent distribution									
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
2-year college	4.4	3.5	6.8	4.8	1.0	7.7	4.0	-	4.3	7.0
4-year college	12.6	10.9	17.4	11.7	18.1	11.5	16.0	-	12.5	14.0
Other education	3.5	2.0	7.6	3.7	1.0	7.7	8.0	-	3.4	4.7
Government	14.2	15.0	11.9	14.1	11.4	26.9	16.0	-	13.8	20.9
Private, not-for-profit	4.0	2.6	8.1	4.4	1.9	3.8	4.0	-	4.0	4.7
Private, for-profit	56.5	62.6	39.4	56.0	64.8	38.5	52.0	50.0	56.9	44.2
Self-employed	4.3	2.8	8.5	4.8	1.0	-	4.0	-	4.3	4.7
Other	0.7	0.8	0.4	0.7	1.0	-	-	-	0.7	-

KEY: - = fewer than 500 estimated/percent distribution not available

NOTE: Because of rounding, details may not add to totals.

SOURCE: National Science Foundation/SRS. 1993 National Survey of College Graduates.

Appendix table 5-16. Doctoral scientists and engineers in the labor force, by employment sector, sex, race/ethnicity, and disability status: 1993

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Employment sector	Total	Sex		Race/ethnicity					Disability status	
		Men	Women	White	Black	Hispanic	Asian	American Indian	Persons without disabilities	Persons with disabilities
Total	462,870	369,260	93,610	390,430	9,620	9,420	51,670	1,730	439,690	23,180
Universities & 4-year colleges	210,070	165,550	44,520	178,840	5,200	4,880	20,270	890	199,370	10,700
Other educational institutions	11,720	7,730	3,990	10,210	420	370	650	70	11,030	690
Private, for-profit	141,190	121,940	19,250	112,680	1,950	2,300	23,860	400	134,870	6,320
Self-employed	28,270	18,620	9,660	26,280	350	430	1,090	120	26,160	2,120
Private, not-for-profit	23,610	16,900	6,720	20,530	490	450	2,090	--	22,570	1,040
Federal government	33,800	27,970	5,830	29,890	690	640	2,470	110	32,310	1,490
State and local government	12,810	9,360	3,450	11,020	480	250	960	90	12,020	790
Other sector	1,390	1,190	200	970	50	110	260	--	1,360	--
	Percent distribution									
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Universities & 4-year colleges	45.4	44.8	47.6	45.8	54.1	51.8	39.2	51.4	45.3	46.2
Other educational institutions	2.5	2.1	4.3	2.6	4.4	3.9	1.3	4.0	2.5	3.0
Private, for-profit	30.5	33.0	20.6	28.9	20.3	24.4	46.2	23.1	30.7	27.3
Self-employed	6.1	5.0	10.3	6.7	3.6	4.6	2.1	6.9	5.9	9.1
Private, not-for-profit	5.1	4.6	7.2	5.3	5.1	4.8	4.0	--	5.1	4.5
Federal government	7.3	7.6	6.2	7.7	7.2	6.8	4.8	6.4	7.3	6.4
State and local government	2.8	2.5	3.7	2.8	5.0	2.7	1.9	5.2	2.7	3.4
Other sector	0.3	0.3	0.2	0.2	0.5	1.2	0.5	--	0.3	--

KEY: -- = fewer than 50 estimated/percent distribution not available

NOTE: Because of rounding, details may not add to totals.

SOURCE: National Science Foundation/SRS. 1993 Survey of Doctorate Recipients.

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Appendix table 5-17. Employed doctoral scientists and engineers, by field of doctorate, sex, and employment sector: 1993

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Field of doctorate and sex	Total employed	Business/industry		Self-employed		University/4-yr college		Other educational institutions		Government		Other	
		Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Total science and engineering	462,870	141,190	30.5	28,270	6.1	210,070	45.4	11,720	2.5	46,600	10.1	25,010	5.4
Men	369,260	121,940	33.0	18,620	5.0	165,550	44.8	7,730	2.1	37,330	10.1	18,090	4.9
Women	93,610	19,250	20.6	9,660	10.3	44,520	47.6	3,990	4.3	9,270	9.9	6,920	7.4
Physical sciences	98,530	43,670	44.3	2,660	2.7	36,410	37.0	2,190	2.2	9,490	9.6	4,110	4.2
Men	88,700	39,390	44.4	2,380	2.7	32,730	36.9	1,830	2.1	8,720	9.8	3,660	4.1
Women	9,840	4,280	43.5	290	2.9	3,690	37.5	360	3.7	770	7.8	450	4.6
Computer science/math	27,940	7,370	26.4	610	2.2	17,320	62.0	640	2.3	1,220	4.4	780	2.8
Men	24,560	6,550	26.7	540	2.2	15,310	62.3	440	1.8	1,050	4.3	660	2.7
Women	3,390	820	24.2	80	2.4	2,010	59.3	200	5.9	160	4.7	120	3.5
Biosciences	105,630	24,040	22.8	3,180	3.0	58,360	55.2	2,400	2.3	11,660	11.0	5,990	5.7
Men	75,850	18,590	24.5	2,270	3.0	40,900	53.9	1,500	2.0	8,700	11.5	3,890	5.1
Women	29,780	5,450	18.3	910	3.1	17,460	58.6	900	3.0	2,960	9.9	2,100	7.1
Agriculture	15,100	4,660	30.9	620	4.1	7,110	47.1	320	2.1	1,900	12.6	480	3.2
Men	13,160	4,090	31.1	590	4.5	6,160	46.8	280	2.1	1,630	12.4	420	3.2
Women	1,930	570	29.5	--	--	960	49.7	50	2.6	280	14.5	50	2.6
Environmental science	3,850	860	22.3	80	2.1	1,430	37.1	60	1.6	1,370	35.6	60	1.6
Men	3,580	820	22.9	80	2.2	1,360	38.0	--	--	1,230	34.4	60	1.7
Women	270	--	--	--	--	70	25.9	--	--	140	51.9	--	--
Psychology	71,020	13,390	18.9	15,660	22.1	23,350	32.9	3,870	5.4	8,180	11.5	6,570	9.3
Men	42,130	8,510	20.2	8,200	19.5	14,040	33.3	2,000	4.7	5,430	12.9	3,940	9.4
Women	28,890	4,880	16.9	7,460	25.8	9,310	32.2	1,860	6.4	2,740	9.5	2,630	9.1
Social sciences	65,660	7,400	11.3	2,950	4.5	41,350	63.0	1,840	2.8	7,400	11.3	4,720	7.2
Men	49,350	5,750	11.7	2,140	4.3	31,470	63.8	1,260	2.6	5,500	11.1	3,230	6.5
Women	16,320	1,650	10.1	820	5.0	9,880	60.5	580	3.6	1,890	11.6	1,490	9.1
Engineering	75,120	39,820	53.0	2,510	3.3	24,720	32.9	390	0.5	5,390	7.2	2,290	3.0
Men	71,930	38,240	53.2	2,430	3.4	23,590	32.8	380	0.5	5,070	7.0	2,210	3.1
Women	3,200	1,570	49.1	80	2.5	1,130	35.3	--	--	320	10.0	80	2.5

KEY: -- = fewer than 50 estimated/percent not available

NOTE: Because of rounding and "no reports," details may not add to totals.

SOURCE: National Science Foundation/SRS. 1993 Survey of Doctorate Recipients.

Appendix table 5-18. All faculty, by sex, race/ethnicity, and field: 1993

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Sex and race/ethnicity	Total	Science and engineering	Agriculture	Bioscience	Physical sciences	Mathematics	Computer science	Psychology	Social sciences	Engineering	Non-S&E programs
Total	899,800	294,400	12,900	48,000	38,200	47,500	25,100	31,200	56,600	35,100	605,300
White, non-Hispanic	783,600	255,100	12,200	42,600	33,600	40,200	21,400	28,400	48,800	27,900	528,500
Asian	43,100	19,400	-	2,600	3,000	3,500	2,100	500	2,300	5,200	23,700
Black, non-Hispanic	43,400	11,700	-	1,800	900	2,200	700	1,500	3,500	800	31,700
Hispanic	25,100	6,800	-	900	800	1,300	500	700	1,600	900	18,300
American Indian	4,600	1,400	-	-	-	-	-	-	-	-	3,200
Men	565,200	224,500	11,600	34,900	32,900	32,500	20,000	17,700	41,800	32,900	340,700
White, non-Hispanic	492,700	194,100	11,000	31,100	28,900	26,800	17,000	16,200	36,700	26,400	298,600
Asian	30,800	16,400	-	1,700	2,600	3,100	1,900	-	1,800	4,700	14,400
Black, non-Hispanic	23,100	7,600	-	1,300	800	1,500	-	600	2,000	700	15,500
Hispanic	15,700	5,300	-	600	700	900	500	-	1,100	900	10,400
American Indian	2,900	1,100	-	-	-	-	-	-	-	-	1,700
Women	334,500	69,900	1,300	13,100	5,300	14,900	5,000	13,400	14,800	2,200	264,600
White, non-Hispanic	290,900	61,000	1,200	11,500	4,700	13,400	4,400	12,200	12,100	1,500	229,800
Asian	12,300	3,000	-	900	-	-	-	-	500	-	9,300
Black, non-Hispanic	20,300	4,100	-	500	-	600	-	800	1,500	-	16,200
Hispanic	9,300	1,500	-	-	-	-	-	-	500	-	7,800
American Indian	1,700	-	-	-	-	-	-	-	-	-	1,400
	Percent distribution										
White, non-Hispanic	87.1	86.7	94.6	88.8	88.0	84.6	85.3	91.0	86.2	79.5	87.3
Asian	4.8	6.6	-	5.4	7.9	7.4	8.4	1.6	4.1	14.8	3.9
Black, non-Hispanic	4.8	4.0	-	3.8	2.4	4.6	2.8	4.8	6.2	2.3	5.2
Hispanic	2.8	2.3	-	1.9	2.1	2.7	2.0	2.2	2.8	2.6	3.0
American Indian	0.5	0.5	-	-	-	-	-	-	-	-	0.5
Men	62.8	76.3	89.9	72.7	86.1	68.4	79.7	56.7	73.9	93.7	56.3
Women	37.2	23.7	10.1	27.3	13.9	31.4	19.9	42.9	26.1	6.3	43.7

KEY: - = fewer than 500 estimated/percent distribution not available

NOTES: Because of rounding, details may not add to totals. Data are preliminary.

SOURCE: U.S. Department of Education/NCES. 1993 National Study of Postsecondary Faculty.

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Appendix table 5-19. Science and engineering faculty, by institutional type, sex, and race/ethnicity: 1993

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Institutional type	Total	Men	Women	White	Asian	Black	Hispanic	American Indian
Total	294,400	224,500	69,900	255,100	19,400	11,700	6,800	1,400
Research	77,300	65,100	12,200	67,500	7,000	1,600	1,200	-
Doctorate	39,800	31,400	8,400	34,900	2,900	1,000	800	-
Comprehensive	65,300	49,800	15,500	54,400	4,700	4,000	1,700	400
Liberal arts	19,100	13,100	5,900	16,800	600	1,300	-	-
Public, 2-year	80,800	55,300	25,500	70,700	3,200	3,600	2,600	800
Other	12,200	9,800	2,400	10,800	1,000	-	-	-
	Percent distribution							
Research	26.3	29.0	17.5	26.5	36.1	13.7	17.6	-
Doctorate	13.5	14.0	12.0	13.7	14.9	8.5	11.8	-
Comprehensive	22.2	22.2	22.2	21.3	24.2	34.2	25.0	28.6
Liberal arts	6.5	5.8	8.4	6.6	3.1	11.1	-	-
Public, 2-year	27.4	24.6	36.5	27.7	16.5	30.8	38.2	57.1
Other	4.1	4.4	3.4	4.2	5.2	-	-	-

KEY: - = fewer than 500 estimated/percent distribution not available

NOTES: Because of rounding, details may not add to totals. Data are preliminary.

SOURCE: U.S. Department of Education/NCES. 1993 National Study of Postsecondary Faculty.

Appendix table 5-20. Science and engineering faculty, by employment status, contract length, sex, and race/ethnicity: 1993

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Employment status and contract length	Total	Men	Women	White	Asian	Black	Hispanic	American Indian
Total	294,400	224,500	69,900	255,100	19,400	11,700	6,800	1,400
Full-time	211,000	169,200	41,800	181,600	15,600	8,100	4,800	800
Part-time	83,400	55,300	28,100	73,500	3,800	3,600	2,000	600
Tenured	133,500	115,400	18,100	117,800	9,100	4,200	2,200	-
One academic term	62,300	41,200	21,000	54,500	2,900	2,800	1,700	-
One academic year	52,300	36,000	16,400	43,300	4,100	2,600	1,800	500
Two or more years	19,900	14,300	5,500	16,700	1,900	700	500	-
Unspecified duration	21,000	14,200	6,800	18,200	1,000	1,000	600	-
Other	5,500	3,400	2,100	4,600	-	-	-	-
	Percent distribution							
Full-time	71.7	75.4	59.8	71.2	80.4	69.2	70.6	57.1
Part-time	28.3	24.6	40.2	28.8	19.6	30.8	29.4	42.9
Tenured	45.3	51.4	25.9	46.2	46.9	35.9	32.4	-
One academic term	21.2	18.4	30.0	21.4	14.9	23.9	25.0	-
One academic year	17.8	16.0	23.5	17.0	21.1	22.2	26.5	35.7
Two or more years	6.8	6.4	7.9	6.5	9.8	6.0	7.4	-
Unspecified duration	7.1	6.3	9.7	7.1	5.2	8.5	8.8	-
Other	1.9	1.5	3.0	1.8	-	-	-	-

KEY: - = fewer than 500 estimated/percent distribution not available

NOTES: Because of rounding, details may not add to totals. Data are preliminary.

SOURCE: U.S. Department of Education/NCES. 1993 National Study of Postsecondary Faculty.

Appendix table 5-21. All faculty, by institutional type, employment status, and sex: 1993

[Percent distribution]

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		Total		Men		Women	
Institutional type	Total	Full-time	Part-time	Full-time	Part-time	Full-time	Part-time
Total faculty	899,800	66.2	33.8	70.7	29.3	58.5	41.5
Research	204,700	83.9	16.1	87.1	12.9	75.7	24.3
Doctorate	122,300	76.1	23.9	78.6	21.4	70.5	29.5
Comprehensive	204,000	69.8	30.2	74.5	25.5	62.2	37.8
Liberal arts	63,500	67.8	32.2	73.3	26.7	60.5	39.5
Public, 2-year	264,600	44.8	55.2	45.3	54.7	44.3	55.7
Other	40,600	65.0	35.0	69.9	30.1	54.8	45.2
Total faculty with a Ph.D	460,800	83.3	16.7	84.4	15.6	80.1	19.9
Research	163,100	89.7	10.3	91.0	9.0	85.4	14.6
Doctorate	93,000	82.3	17.7	82.7	17.3	81.0	19.0
Comprehensive	117,000	85.5	14.5	86.7	13.3	82.6	17.4
Liberal arts	30,900	83.9	16.1	85.9	14.1	80.1	19.9
Public, 2-year	38,600	56.6	43.4	54.9	45.1	60.1	39.9
Other	18,200	72.5	27.5	75.0	25.0	62.1	37.9

NOTE: Data are preliminary.

SOURCE: U.S. Department of Education/NCES. 1993 National Study of Postsecondary Faculty.

Appendix table 5-22. Science and engineering faculty, by highest degree, sex, and race/ethnicity: 1993

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Highest degree	Total	Men	Women	White	Asian	Black	Hispanic	American Indian
Total	294,400	224,500	69,900	251,100	19,400	11,700	6,800	1,400
Ph.D.	173,300	143,200	30,200	148,800	14,500	5,900	3,700	-
1st Professional	12,200	9,700	2,500	10,100	1,100	500	500	-
Master's	83,700	54,400	29,300	74,200	3,100	4,400	1,600	500
Bachelor's	20,400	13,700	6,800	18,000	500	800	900	-
Less than bachelor's	3,000	2,300	700	2,800	-	-	-	-
Not reported	1,700	1,200	500	1,300	-	-	-	-
	Percent distribution							
Ph.D.	58.9	63.8	43.2	59.3	74.7	50.4	54.4	-
1st Professional	4.1	4.3	3.6	4.0	5.7	4.3	7.4	-
Master's	28.4	24.2	41.9	29.5	16.0	37.6	23.5	35.7
Bachelor's	6.9	6.1	9.7	7.2	2.6	6.8	13.2	-
Less than bachelor's	1.0	1.0	1.0	1.1	-	-	-	-
Not reported	0.6	0.5	0.7	0.5	-	-	-	-

KEY: - = fewer than 500 estimated/percent distribution not available

NOTES: Because of rounding, details may not add to totals. Data are preliminary.

SOURCE: U.S. Department of Education/NCES. 1993 National Study of Postsecondary Faculty.

Appendix table 5-23. Full-time science and engineering faculty, by sex, type of school, and actual and preferred time in activities: 1993

[In percentages]

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Sex and type of school	Total	Actual time allocation				Preferred time allocation			
		Teaching	Research	Administration	Other activity	Teaching	Research	Administration	Other activity
Total	211,000	49.9	25.3	12.8	11.8	44.9	32.1	7.8	14.9
Research	70,200	33.3	42.2	13.2	11.1	30.9	48.1	7.4	13.3
Doctorate	32,400	41.3	34.8	11.9	11.8	37.1	41.6	6.8	14.2
Comprehensive	48,500	59.5	15.6	12.7	11.9	50.9	25.0	8.2	15.5
Liberal arts	14,700	62.0	13.5	13.9	10.1	55.1	22.3	8.0	14.3
Public, 2-year	36,500	70.0	4.2	12.1	13.7	65.1	8.8	8.4	17.7
Other	8,700	58.0	15.0	15.1	11.9	52.0	21.3	10.2	16.5
Men	169,200	48.6	26.3	13.1	11.7	44.1	33.1	8.0	14.6
Research	60,300	33.5	41.8	13.5	11.0	31.3	47.8	7.6	13.1
Doctorate	26,700	40.6	35.1	12.4	11.6	37.0	41.8	7.1	13.8
Comprehensive	38,700	58.7	16.1	13.0	12.0	50.5	25.2	8.5	15.5
Liberal arts	10,400	60.6	14.0	14.4	10.4	55.3	21.8	8.2	14.7
Public, 2-year	25,800	69.9	4.3	12.1	13.7	65.1	9.1	8.5	17.4
Other	7,300	57.5	16.4	15.1	11.1	51.3	22.6	10.4	15.7
Women	41,800	55.0	20.9	11.5	12.3	48.4	28.1	7.0	16.1
Research	9,900	31.7	44.7	11.0	11.9	28.5	50.2	5.8	14.9
Doctorate	5,800	44.6	33.1	9.5	12.7	37.8	40.8	5.5	15.9
Comprehensive	9,700	62.8	13.7	11.4	11.7	52.3	24.2	7.0	15.8
Liberal arts	4,300	65.4	12.3	12.5	9.3	54.6	23.4	7.6	13.3
Public, 2-year	10,700	70.1	3.9	12.1	13.8	65.3	8.0	8.3	18.4
Other	1,400	60.7	7.8	15.2	16.4	56.2	14.2	9.1	20.6

NOTES: Because of rounding, details may not add to totals. Data are preliminary.

SOURCE: U.S. Department of Education/NCES. 1993 National Study of Postsecondary Faculty.

Appendix table 5-24. Full-time science and engineering faculty, by sex, race/ethnicity, funded research, and PI or Co-PI for grants: 1993

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Sex and race/ethnicity	Total	Engaged in funded research			Respondent PI or Co-PI for any grants		
		Yes	No	Percent yes	Yes	No	Percent yes
Total	211,000	86,000	125,000	40.8	76,100	134,900	36.1
Men	169,200	72,900	96,200	43.1	65,500	103,700	38.7
Women	41,800	13,100	28,700	31.3	10,700	31,200	25.6
White, non-Hispanic	181,600	74,300	107,300	40.9	65,800	115,800	36.2
Asian	15,600	7,300	8,300	46.8	6,600	9,000	42.3
Black, non-Hispanic	8,100	2,200	5,900	27.2	1,800	6,300	22.2
Hispanic	4,800	2,000	2,900	41.7	1,700	3,100	35.4
American Indian	800	-	600	-	-	600	-

KEY: - = fewer than 500 estimated
PI = principal investigator

NOTES: Because of rounding, details may not add to totals. Data are preliminary.

SOURCE: U.S. Department of Education/NCES. 1993 National Study of Postsecondary Faculty.

Appendix table 5-25. Full-time science and engineering faculty, by sex, age, institution type, and mean number of presentations and publications in the past 2 years: 1993

Page 1 of 1

Sex, age, and institution type	Refereed articles	Nonrefereed articles	Creative works	Book reviews and chapters	Textbooks, books, monographs, and reports	Presentations	Patents and software
Men	2.82	0.86	0.38	0.82	1.58	3.61	0.19
Younger than 35	2.82	0.67	0.36	0.56	1.11	3.75	0.23
35 to 44 years old	3.54	0.73	0.39	0.93	1.70	4.27	0.19
45 to 54 years old	2.50	0.91	0.38	0.79	1.93	3.35	0.24
55 to 64 years old	2.34	1.04	0.33	0.77	1.27	3.60	0.13
65 to 70 years old	3.78	0.54	0.58	1.04	0.94	1.80	0.18
71 years old or older	1.88	0.67	0.02	0.67	0.37	1.36	0.01
Research	4.93	1.39	0.41	1.25	2.14	5.43	0.23
Doctorate	3.86	0.95	0.44	0.98	2.04	4.68	0.24
Comprehensive	1.34	0.59	0.40	0.53	1.22	2.48	0.17
Liberal arts	1.24	0.51	0.45	0.75	0.77	2.49	0.15
Public, 2-year	0.15	0.12	0.16	0.15	0.66	0.87	0.10
Other	1.17	0.61	0.40	0.58	1.65	2.02	0.21
Women	1.65	0.51	0.31	0.68	0.94	3.26	0.12
Younger than 35	1.00	0.29	0.12	0.48	0.91	2.57	0.04
35 to 44 years old	2.29	0.73	0.45	0.74	1.28	3.84	0.11
45 to 54 years old	1.32	0.43	0.24	0.64	0.69	3.13	0.17
55 to 64 years old	1.39	0.31	0.30	0.84	0.43	2.96	0.05
65 to 70 years old	0.92	0.24	0.00	0.66	1.16	1.09	0.31
71 years old or older	0.45	0.00	0.00	0.00	1.62	2.22	0.34
Research	3.84	1.19	0.58	1.16	1.44	5.74	0.27
Doctorate	2.51	0.62	0.35	0.93	1.61	4.61	0.04
Comprehensive	1.02	0.28	0.16	0.62	0.63	2.48	0.13
Liberal arts	0.79	0.15	0.12	0.57	0.65	2.28	0.08
Public, 2-year	0.22	0.20	0.24	0.23	0.52	1.40	0.04
Other	0.48	0.27	0.30	0.34	1.00	2.97	0.07

NOTE: Data are preliminary.

SOURCE: U.S. Department of Education/NCES. 1993 National Study of Postsecondary Faculty.

Appendix table 5-26. Full-time science and engineering faculty, by sex, race/ethnicity, and whether or not department chair: 1993

Page 1 of 1

Sex and race/ethnicity	Total	Chair	Not chair
Total	211,000	27,700	183,300
Men	169,200	23,100	146,100
Women	41,800	4,600	37,300
White, non-Hispanic	181,600	24,000	157,700
Asian	15,600	1,800	13,800
Black, non-Hispanic	8,100	1,100	7,000
Hispanic	4,800	700	4,200
American Indian	800	-	700
	Percent distribution		
Men	100.0	13.7	86.3
Women	100.0	10.9	89.1
White, non-Hispanic	100.0	13.2	86.8
Asian	100.0	11.5	88.5
Black, non-Hispanic	100.0	13.6	86.4
Hispanic	100.0	14.6	87.5
American Indian	100.0	-	87.5

KEY: - = fewer than 500 estimated/percent distribution not available

NOTES: Because of rounding, details may not add to totals. Data are preliminary.

SOURCE: U.S. Department of Education/NCES. 1993 National Study of Postsecondary Faculty.

Women, Minorities, and Persons With Disabilities in Science and Engineering: 1996

Appendix table 5-27. Full-time ranked science and engineering faculty, by rank, years since doctorate, sex, and race/ethnicity: 1993

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Rank and years since doctorate	Total	Men	Women	White	Asian	Black	Hispanic	American Indian
All ranks	150,400	126,100	24,300	129,300	12,600	4,900	3,100	500
Less than 7 years	25,600	18,400	7,200	20,200	3,300	1,100	800	-
7 to 12 years	27,900	21,500	6,400	23,700	1,900	1,400	900	-
13 years or more	96,900	86,300	10,700	85,400	7,500	2,400	1,500	-
Full professor	71,500	64,900	6,600	63,200	5,200	1,600	1,400	-
Less than 7 years	800	500	-	600	-	-	-	-
7 to 12 years	2,900	2,500	500	2,500	-	-	-	-
13 years or more	67,800	61,900	5,900	60,100	5,000	1,400	1,200	-
Associate professor	42,100	34,400	7,700	36,200	3,500	1,800	500	100
Less than 7 years	2,900	2,400	500	2,300	-	-	-	-
7 to 12 years	14,500	11,500	3,000	12,500	1,000	800	-	-
13 years or more	24,600	20,500	4,200	21,400	2,000	900	-	-
Assistant professor	36,900	26,800	10,000	29,900	4,000	1,500	1,200	-
Less than 7 years	22,000	15,500	6,500	17,300	2,800	900	800	-
7 to 12 years	10,400	7,500	2,900	8,800	800	-	-	-
13 years or more	4,500	3,900	600	3,800	-	-	-	-
	Percent distribution							
All ranks	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Less than 7 years	100.0	100.0	100.0	100.0	100.0	100.0	100.0	-
7 to 12 years	100.0	100.0	100.0	100.0	100.0	100.0	100.0	-
13 years or more	100.0	100.0	100.0	100.0	100.0	100.0	100.0	-
Full professor	47.5	51.5	27.2	48.9	41.3	32.7	45.2	-
Less than 7 years	3.1	2.7	-	3.0	-	-	-	-
7 to 12 years	10.4	11.6	7.8	10.5	-	-	-	-
13 years or more	70.0	71.7	55.1	70.4	66.7	58.3	80.0	-
Associate professor	28.0	27.3	31.7	28.0	27.8	36.7	16.1	20.0
Less than 7 years	11.3	13.0	6.9	11.4	-	-	-	-
7 to 12 years	52.0	53.5	46.9	52.7	52.6	57.1	-	-
13 years or more	25.4	23.8	39.3	25.1	26.7	37.5	-	-
Assistant professor	24.5	21.3	41.2	23.1	31.7	30.6	38.7	-
Less than 7 years	85.9	84.2	90.3	85.6	84.8	81.8	100.0	-
7 to 12 years	37.3	34.9	45.3	37.1	42.1	-	-	-
13 years or more	4.6	4.5	5.6	4.4	-	-	-	-

KEY: - = fewer than 500 estimated/percent distribution not available

NOTES: Because of rounding, details may not add to totals. Data are preliminary.

SOURCE: U.S. Department of Education/NCES. 1993 National Study of Postsecondary Faculty.

Appendix table 5-28. Full-time ranked science and engineering faculty, by tenure status, sex, and race/ethnicity: 1993

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Tenure status	Total	Men	Women	White	Asian	Black	Hispanic	American Indian
Total	211,000	169,100	41,800	181,800	15,200	7,400	4,200	-
Tenured	130,900	113,100	17,800	115,800	8,700	4,000	2,200	-
Tenure track	43,100	30,600	12,500	34,500	4,100	2,200	2,000	-
Not tenure track	17,500	11,900	5,600	14,000	1,800	1,200	-	-
No tenure for faculty status	7,300	5,100	2,200	6,300	600	-	-	-
No tenure at institution	12,200	8,400	3,700	11,200	-	-	-	-
	Percent distribution							
Tenured	62.0	66.9	42.6	63.7	57.2	54.1	52.4	-
Tenure track	20.4	18.1	29.9	19.0	27.0	29.7	47.6	-
Not tenure track	8.3	7.0	13.4	7.7	11.8	16.2	-	-
No tenure for faculty status	3.5	3.0	5.3	3.5	3.9	-	-	-
No tenure at institution	5.8	5.0	8.9	6.2	-	-	-	-

KEY: - = fewer than 500 estimated/percent distribution not available

NOTES: Because of rounding, details may not add to totals. Data are preliminary.

SOURCE: U.S. Department of Education/NCES. 1993 National Study of Postsecondary Faculty.

Appendix 5-29. Primary work activity of employed bachelor's and master's scientists and engineers, by age and sex: 1993

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Primary work activity and age	Bachelor's			Master's		
	Total	Men	Women	Total	Men	Women
Total, all activities, all ages	1,556,000	1,260,000	297,000	673,000	521,000	152,000
Younger than 30 years old	189,000	139,000	52,000	51,000	36,000	14,000
30 to 39 years old	674,000	518,000	153,000	258,000	191,000	69,000
40 to 49 years old	422,000	351,000	67,000	225,000	181,000	46,000
50 to 59 years old	188,000	169,000	19,000	101,000	86,000	17,000
60 years old or older	86,000	80,000	5,000	37,000	29,000	5,000
Accounting, finance, total	36,000	28,000	8,000	12,000	9,000	2,000
Younger than 30 years old	2,000	2,000	1,000	1,000	-	-
30 to 39 years old	14,000	10,000	3,000	4,000	3,000	1,000
40 to 49 years old	11,000	8,000	3,000	4,000	4,000	-
50 to 59 years old	6,000	5,000	1,000	2,000	2,000	1,000
60 years old or older	2,000	2,000	-	-	-	-
Applied research, total	125,000	97,000	28,000	90,000	69,000	21,000
Younger than 30 years old	17,000	12,000	5,000	8,000	6,000	2,000
30 to 39 years old	61,000	45,000	16,000	39,000	28,000	11,000
40 to 49 years old	27,000	22,000	5,000	26,000	21,000	5,000
50 to 59 years old	14,000	12,000	2,000	12,000	11,000	2,000
60 years old or older	7,000	6,000	1,000	5,000	4,000	-
Basic research, total	23,000	18,000	5,000	9,000	7,000	2,000
Younger than 30 years old	4,000	3,000	1,000	1,000	1,000	-
30 to 39 years old	11,000	8,000	3,000	3,000	2,000	1,000
40 to 49 years old	5,000	4,000	1,000	2,000	2,000	-
50 to 59 years old	2,000	2,000	-	1,000	1,000	-
60 years old or older	1,000	1,000	-	1,000	1,000	-
Computer applications, total	451,000	332,000	119,000	160,000	122,000	38,000
Younger than 30 years old	65,000	45,000	20,000	15,000	11,000	5,000
30 to 39 years old	216,000	154,000	62,000	66,000	49,000	17,000
40 to 49 years old	121,000	93,000	28,000	54,000	41,000	13,000
50 to 59 years old	39,000	32,000	7,000	19,000	17,000	3,000
60 years old or older	10,000	8,000	2,000	6,000	5,000	1,000
Development, total	121,000	105,000	16,000	55,000	48,000	7,000
Younger than 30 years old	17,000	13,000	4,000	5,000	4,000	1,000
30 to 39 years old	51,000	44,000	7,000	24,000	20,000	4,000
40 to 49 years old	29,000	26,000	3,000	16,000	14,000	1,000
50 to 59 years old	15,000	14,000	1,000	8,000	7,000	1,000
60 years old or older	8,000	8,000	-	3,000	2,000	-
Design of equipment, total	238,000	217,000	21,000	86,000	78,000	9,000
Younger than 30 years old	29,000	25,000	4,000	7,000	6,000	1,000
30 to 39 years old	101,000	88,000	12,000	35,000	30,000	5,000
40 to 49 years old	60,000	56,000	3,000	26,000	25,000	2,000
50 to 59 years old	31,000	30,000	1,000	13,000	12,000	1,000
60 years old or older	18,000	17,000	1,000	6,000	5,000	-
Employee relations, total	16,000	10,000	7,000	9,000	6,000	3,000
Younger than 30 years old	2,000	1,000	1,000	2,000	1,000	1,000
30 to 39 years old	6,000	3,000	3,000	2,000	1,000	1,000
40 to 49 years old	6,000	4,000	2,000	3,000	2,000	1,000
50 to 59 years old	2,000	1,000	1,000	1,000	1,000	-
60 years old or older	-	-	-	-	-	-

See explanatory information and SOURCE at end of table.

Appendix 5-29. Primary work activity of employed bachelor's and master's scientists and engineers, by age and sex: 1993

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Primary work activity and age	Bachelor's			Master's		
	Total	Men	Women	Total	Men	Women
Management and administration, total	175,000	149,000	26,000	79,000	66,000	13,000
Younger than 30 years old	10,000	8,000	2,000	4,000	2,000	1,000
30 to 39 years old	70,000	55,000	15,000	27,000	20,000	7,000
40 to 49 years old	59,000	51,000	8,000	32,000	29,000	4,000
50 to 59 years old	27,000	25,000	1,000	15,000	13,000	2,000
60 years old or older	10,000	10,000	-	2,000	2,000	-
Production, operations, maintenance, total	65,000	59,000	6,000	11,000	9,000	2,000
Younger than 30 years old	9,000	7,000	2,000	1,000	1,000	-
30 to 39 years old	25,000	23,000	2,000	4,000	3,000	1,000
40 to 49 years old	18,000	17,000	1,000	4,000	4,000	1,000
50 to 59 years old	10,000	10,000	-	1,000	1,000	-
60 years old or older	3,000	3,000	-	1,000	1,000	-
Professional services, total	57,000	44,000	13,000	66,000	34,000	32,000
Younger than 30 years old	5,000	2,000	3,000	3,000	1,000	2,000
30 to 39 years old	22,000	16,000	6,000	21,000	13,000	9,000
40 to 49 years old	17,000	13,000	3,000	25,000	12,000	13,000
50 to 59 years old	10,000	9,000	2,000	11,000	6,000	5,000
60 years old or older	4,000	4,000	-	6,000	3,000	3,000
Sales, purchasing, marketing, total	70,000	61,000	9,000	23,000	20,000	3,000
Younger than 30 years old	8,000	7,000	2,000	1,000	1,000	-
30 to 39 years old	26,000	22,000	4,000	7,000	6,000	1,000
40 to 49 years old	19,000	17,000	1,000	9,000	8,000	1,000
50 to 59 years old	8,000	8,000	1,000	4,000	4,000	-
60 years old or older	8,000	8,000	-	1,000	1,000	-
Quality/productivity management, total	59,000	49,000	10,000	22,000	18,000	4,000
Younger than 30 years old	7,000	5,000	2,000	1,000	1,000	-
30 to 39 years old	24,000	19,000	5,000	9,000	7,000	3,000
40 to 49 years old	16,000	13,000	2,000	7,000	6,000	1,000
50 to 59 years old	9,000	9,000	1,000	4,000	3,000	-
60 years old or older	4,000	3,000	-	1,000	1,000	-
Teaching, total	11,000	6,000	6,000	6,000	4,000	1,000
Younger than 30 years old	2,000	1,000	1,000	-	-	-
30 to 39 years old	4,000	1,000	2,000	2,000	1,000	1,000
40 to 49 years old	4,000	2,000	2,000	2,000	2,000	-
50 to 59 years old	1,000	-	-	1,000	1,000	-
60 years old or older	1,000	1,000	-	-	-	-
Other, total	109,000	85,000	23,000	45,000	31,000	15,000
Younger than 30 years old	12,000	8,000	4,000	2,000	1,000	1,000
30 to 39 years old	43,000	30,000	13,000	15,000	8,000	7,000
40 to 49 years old	30,000	25,000	5,000	15,000	11,000	4,000
50 to 59 years old	14,000	12,000	1,000	9,000	7,000	2,000
60 years old or older	10,000	9,000	1,000	5,000	4,000	1,000

KEY: - = fewer than 500 estimated

NOTE: Because of rounding, details may not add to totals.

SOURCE: National Science Foundation/SRS. 1993 National Survey of College Graduates.

Appendix table 5-30. Doctoral scientists and engineers employed in business or industry, by primary work activity, year of doctorate, and sex: 1993

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Primary work activity and year of doctorate	All	Men		Women	
		Number	Percent	Number	Percent
Total, all work activities	141,190	121,940	100.0	19,250	100.0
1991–1992 graduates	11,150	8,490	100.0	2,660	100.0
1985–1990 graduates	30,920	24,370	100.0	6,550	100.0
1980–1984 graduates	25,590	21,020	100.0	4,570	100.0
1970–1979 graduates	48,120	43,510	100.0	4,610	100.0
Pre-1970 graduates	25,410	24,550	100.0	860	100.0
Research and development	71,850	63,420	52.0	8,430	43.8
1991–1992 graduates	7,420	6,010	70.8	1,410	53.0
1985–1990 graduates	19,580	16,120	66.1	3,450	52.7
1980–1984 graduates	13,170	11,270	53.6	1,890	41.4
1970–1979 graduates	20,650	19,230	44.2	1,420	30.8
Pre-1970 graduates	11,030	10,790	44.0	240	27.9
Teaching	810	530	0.4	270	1.4
1991–1992 graduates	70	--	--	--	--
1985–1990 graduates	140	60	0.2	90	1.4
1980–1984 graduates	110	80	0.4	--	--
1970–1979 graduates	250	180	0.4	60	1.3
Pre-1970 graduates	240	180	0.7	60	7.0
Management, sales, & administration	34,910	30,910	25.3	4,000	20.8
1991–1992 graduates	710	520	6.1	200	7.5
1985–1990 graduates	3,880	2,910	11.9	970	14.8
1980–1984 graduates	6,060	4,920	23.4	1,140	24.9
1970–1979 graduates	15,620	14,120	32.5	1,500	32.5
Pre-1970 graduates	8,630	8,450	34.4	180	20.9
Computer applications	12,560	11,440	9.4	1,120	5.8
1991–1992 graduates	1,350	1,160	13.7	190	7.1
1985–1990 graduates	3,070	2,810	11.5	260	4.0
1980–1984 graduates	2,640	2,280	10.8	370	8.1
1970–1979 graduates	4,080	3,820	8.8	260	5.6
Pre-1970 graduates	1,420	1,380	5.6	--	--
Other activities	21,070	15,630	12.8	5,440	28.3
1991–1992 graduates	1,600	780	9.2	830	31.2
1985–1990 graduates	4,240	2,470	10.1	1,780	27.2
1980–1984 graduates	3,610	2,470	11.8	1,140	24.9
1970–1979 graduates	7,520	6,150	14.1	1,370	29.7
Pre-1970 graduates	4,090	3,760	15.3	340	39.5

KEY: -- = fewer than 50 estimated/percent not available

NOTES: The business or industry classification excludes individuals who reported self-employment.
Because of rounding, details may not add to totals.

SOURCE: National Science Foundation/SRS. 1993 Survey of Doctorate Recipients.

Appendix table 5-31. Median annual salaries of full-time employed bachelor's and master's scientists and engineers, by occupation, sex, and age: 1993

[In dollars]

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Degree, sex, and field of occupation	Total	Younger than 30	30–39	40–49	50 and older
Bachelor's					
Men:					
Mathematical/computer science	48,000	38,400	46,500	52,000	52,400
Life sciences	36,000	24,600	35,000	36,500	45,000
Physical sciences	41,800	32,000	38,000	48,000	52,800
Social sciences	35,800	-	31,500	43,000	-
Engineering	50,000	39,000	48,000	52,500	60,000
Women:					
Mathematical/computer science	40,000	35,400	40,800	42,400	44,000
Life sciences	33,000	24,000	33,500	42,000	42,000
Physical sciences	38,000	33,400	38,000	42,600	38,100
Social sciences	29,100	22,000	29,100	34,200	-
Engineering	43,900	40,000	45,000	45,000	48,000
Master's					
Men:					
Mathematical/computer science	45,000	52,000	58,000	57,000	53,000
Life sciences	23,400	36,000	42,000	50,400	40,200
Physical sciences	30,000	44,300	56,000	55,000	48,000
Social sciences	-	32,000	43,200	45,000	40,000
Engineering	43,000	52,000	60,600	64,800	57,000
Women:					
Mathematical/computer science	42,000	46,000	48,000	46,800	46,000
Life sciences	23,500	33,500	39,900	40,900	34,700
Physical sciences	-	46,000	41,100	-	41,100
Social sciences	30,000	35,500	38,000	41,900	37,000
Engineering	42,000	50,000	52,000	50,500	49,400

KEY: - = fewer than 500 estimated

NOTE: Because of rounding, details may not add to totals.

SOURCE: National Science Foundation/SRS. 1993 National Survey of College Graduates.

Appendix table 5-32: Variable means and percent of the doctoral science and engineering salary gaps, as explained for women compared with men, and persons with disabilities compared with persons without disabilities: 1993

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	Variable means					Percent of salary gap explained		
	Sex		Disability					
Characteristics	Men	Women	None	At degree	After degree	Women compared with men	Disability at degree compared with no disability	Disability after degree compared with no disability
Salary	$63,600	$50,200	$60,800	$59,200	$66,500			
Dependent variable:								
Log of salary	11.1	10.8	11.0	11.0	11.1			
Independent variables						89.6%	24.2%	120.5%
Years since receipt of Ph.D.1						24.3%	-27.7%	85.2%
Years since receipt of Ph.D.	15.7	10.4	14.5	15.3	21.8	39.5%	-47.4%	142.5%
Years since receipt of Ph.D. squared	333.5	165.0	296.8	320.8	536.0	-15.3%	19.7%	-57.2%
Field of degree						11.2%	13.2%	-18.3%
Main effects						19.9%	19.2%	-5.7%
Computer science	1.3%	1.0%	1.3%	1.5%	0.1%	0.4%	-3.3%	-3.9%
Mathematical sciences	5.8%	3.1%	5.2%	5.6%	6.7%	1.0%	-1.2%	1.5%
Agricultural sciences	3.5%	2.4%	3.3%	4.0%	2.3%	-0.1%	0.5%	0.2%
[Biological sciences]**	21.2%	35.9%	23.9%	23.1%	22.3%	--	--	--
Environmental sciences	1.0%	0.4%	0.9%	0.9%	1.4%	0.1%	0.0%	0.1%
Chemistry	12.7%	8.1%	11.9%	9.8%	12.9%	1.6%	6.5%	0.9%
Geosciences	3.1%	1.5%	2.8%	2.3%	2.3%	0.5%	1.3%	-0.4%
Physics/astronomy	8.9%	2.1%	7.7%	6.4%	8.3%	3.8%	6.4%	0.9%
Other physical sciences	0.3%	0.3%	0.3%	0.7%	0.3%	0.0%	-0.8%	0.0%
Economics	4.6%	3.1%	4.3%	5.4%	5.0%	1.1%	-7.5%	1.4%
Political science	3.1%	3.2%	3.0%	5.7%	5.4%	0.0%	-2.4%	0.6%
Psychology	8.9%	22.4%	11.3%	11.8%	12.5%	-1.1%	-0.4%	0.3%
Sociology/anthropology	3.4%	8.3%	4.3%	4.3%	4.8%	1.1%	0.1%	-0.3%
Other social sciences	2.3%	4.3%	2.6%	5.2%	1.3%	-0.5%	-5.3%	-0.8%
Aeroengineering	0.8%	0.0%	0.7%	0.3%	0.3%	0.5%	2.3%	-0.6%
Chemical engineering	3.0%	0.6%	2.6%	3.4%	0.9%	2.2%	-6.3%	-4.2%
Electrical engineering	6.7%	0.9%	5.7%	3.9%	5.1%	4.8%	13.4%	-1.2%
Industrial engineering	0.4%	0.4%	0.4%	0.1%	0.4%	0.1%	2.8%	-0.1%
Mechanical engineering	2.5%	0.3%	2.1%	0.9%	2.6%	1.6%	8.0%	0.9%
Other engineering	6.5%	1.7%	5.7%	4.8%	5.1%	3.0%	5.3%	-1.0%
Interaction with years since degree						-8.7%	-6.1%	-12.6%
Computer science	0.08	0.05	0.08	0.08	0.01	-0.1%	0.1%	0.6%
Mathematical sciences	1.00	0.40	0.88	0.95	1.49	-0.5%	0.5%	-1.3%
Agricultural sciences	0.52	0.20	0.47	0.53	0.41	-0.4%	0.7%	0.2%
[Biological sciences]**	3.22	3.73	3.26	3.59	4.99	--	--	--
Environmental sciences	0.15	0.02	0.12	0.08	0.25	-0.1%	-0.5%	-0.4%
Chemistry	2.23	0.85	1.96	1.66	3.17	-1.9%	-3.7%	-4.5%
Geosciences	0.49	0.12	0.42	0.43	0.50	-0.2%	0.0%	-0.1%
Physics/astronomy	1.55	0.23	1.29	1.22	2.04	-1.5%	-0.8%	-2.3%
Other physical sciences	0.02	0.01	0.02	0.03	0.04	0.0%	0.2%	-0.1%
Economics	0.72	0.37	0.65	0.58	0.94	0.0%	-0.1%	-0.1%
Political science	0.51	0.39	0.46	1.04	1.04	0.0%	-1.8%	0.5%
Psychology	1.37	2.36	1.52	1.66	2.53	1.1%	1.3%	-2.9%
Sociology/anthropology	0.55	0.96	0.61	0.68	0.99	-0.1%	-0.2%	0.4%
Other social sciences	0.34	0.43	0.35	0.75	0.21	0.2%	6.1%	0.6%

See explanatory information and SOURCE at end of table.

Appendix table 5-32: Variable means and percent of the doctoral science and engineering salary gaps, as explained for women compared with men, and persons with disabilities compared with persons without disabilities: 1993

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	Variable means					Percent of salary gap explained		
	Sex		Disability					
Characteristics	Men	Women	None	At degree	After degree	Women compared with men	Disability at degree compared with no disability	Disability after degree compared with no disability
Aeroengineering	0.13	0.01	0.11	0.02	0.05	-0.2%	-1.4%	0.3%
Chemical engineering	0.47	0.03	0.40	0.51	0.19	-0.9%	2.1%	1.1%
Electrical engineering	0.99	0.06	0.82	0.55	1.21	-2.2%	-5.7%	-2.4%
Industrial engineering	0.06	0.02	0.06	0.01	0.08	-0.1%	-0.5%	-0.1%
Mechanical engineering	0.35	0.03	0.28	0.14	0.59	-0.5%	-2.0%	-1.2%
Other engineering	0.93	0.12	0.78	0.73	1.06	-1.2%	-0.6%	-1.1%
Other work-related characteristics						18.7%	-35.6%	53.6%
Age when doctorate received						5.0%	30.6%	0.4%
Age at Ph.D.	31.0	32.9	31.3	32.6	31.2	26.9%	160.7%	4.4%
Age at Ph.D. squared	976.8	1119.2	1000.7	1094.4	990.9	-21.9%	-130.1%	-4.0%
Whether attended professional society meeting or conference within the past year*	81.2%	84.9%	82.1%	81.8%	74.3%	-0.7%	0.5%	-3.7%
Number of professional societies or associations belonged to	2.6	2.8	2.7	3.0	2.8	-0.8%	-18.9%	1.6%
Highest degree since doctorate*						0.2%	0.1%	0.2%
MBA	0.9%	0.6%	0.9%	0.6%	1.6%	0.1%	0.5%	0.4%
Master's	1.0%	1.3%	1.1%	1.6%	0.7%	0.1%	1.4%	0.3%
Other doctorate	0.3%	0.2%	0.2%	0.0%	0.3%	0.0%	0.0%	0.0%
JD,LLB,LLM	0.4%	0.5%	0.4%	0.9%	0.2%	-0.1%	-2.8%	-0.3%
MD	1.2%	1.1%	1.2%	0.9%	1.0%	0.1%	1.8%	-0.3%
Other professional degree	0.2%	0.4%	0.2%	0.0%	0.1%	0.1%	-0.6%	0.1%
Other degree	0.1%	0.2%	0.1%	0.0%	0.1%	0.0%	-0.3%	0.0%
Bachelor's degree	0.1%	0.1%	0.1%	0.1%	0.1%	0.0%	0.1%	0.0%
[No degree]**	95.9%	95.7%	95.9%	95.8%	96.0%	--	--	--
Taken courses since last degree?*	22.7%	24.6%	22.8%	24.4%	30.7%	0.2%	1.2%	-1.8%
Previously retired?*	2.7%	1.3%	2.4%	3.8%	4.2%	-0.5%	4.6%	-1.7%
Full-time experience						13.3%	-47.6%	50.3%
Years full-time experience	17.8	12.9	16.7	18.6	23.9	23.3%	-80.4%	90.3%
Years full-time experience squared	417.0	235.5	376.1	441.8	649.6	-10.0%	32.8%	-39.9%
Have employment-related license?*	15.2%	24.9%	16.9%	19.2%	14.8%	-1.1%	-2.3%	-0.6%
Same occupation?*	73.7%	60.9%	71.0%	72.0%	86.0%	2.2%	-1.5%	6.7%
Employed in 1988?*	95.2%	90.7%	94.2%	95.4%	98.1%	1.0%	-2.3%	2.2%
Employer characteristics						9.9%	69.6%	-25.2%
Type of employer***						11.6%	53.7%	-21.1%
2-year college	1.2%	1.8%	1.3%	1.2%	1.5%	0.7%	-1.4%	-0.5%
Research institution I	20.8%	23.6%	21.4%	23.1%	18.3%	2.0%	11.6%	5.9%
Research institution II	4.5%	3.7%	4.4%	3.2%	5.5%	-0.7%	-9.7%	-2.7%
Doctorate granting I	2.6%	2.8%	2.5%	4.3%	4.5%	0.2%	15.9%	-5.2%
Doctorate granting II	3.1%	3.1%	3.1%	3.4%	3.5%	0.0%	3.0%	-1.1%
Comprehensive I	8.1%	9.5%	8.3%	10.9%	11.0%	1.5%	25.5%	-7.8%

See explanatory information and SOURCE at end of table.

Appendix table 5-32: Variable means and percent of the doctoral science and engineering salary gaps, as explained for women compared with men, and persons with disabilities compared with persons without disabilities: 1993

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Characteristics	Variable means: Sex: Men	Variable means: Sex: Women	Variable means: Disability: None	Variable means: Disability: At degree	Variable means: Disability: After degree	Percent of salary gap explained: Women compared with men	Percent of salary gap explained: Disability at degree compared with no disability	Percent of salary gap explained: Disability after degree compared with no disability
Comprehensive II	0.6%	0.9%	0.6%	0.5%	1.5%	0.4%	-1.7%	-3.2%
Liberal arts I	1.8%	3.0%	2.0%	2.5%	2.2%	1.2%	4.8%	-0.6%
Liberal arts II	1.6%	2.0%	1.7%	1.4%	1.4%	0.6%	-3.8%	1.4%
Medical school (Carnegie classification)	2.2%	4.4%	2.6%	2.3%	2.5%	1.5%	-2.0%	0.2%
Medical school (self-classification)	7.0%	12.7%	8.1%	6.3%	5.4%	-0.5%	1.4%	-0.6%
Health related schools that are not medical schools	0.3%	0.9%	0.4%	0.5%	0.1%	0.0%	0.0%	0.0%
Univ.-affiliated research institute	4.7%	3.9%	4.5%	5.9%	6.2%	0.0%	0.5%	-0.2%
Other educational institution	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-0.1%	0.0%
Elementary/mid/secondary school	0.8%	2.4%	1.0%	1.8%	0.8%	1.5%	6.3%	0.5%
Private, for-profit company	33.1%	21.0%	31.2%	26.5%	26.3%	--	--	--
Private, not-for-profit organization	4.9%	7.4%	5.3%	5.2%	5.4%	1.7%	-1.1%	0.0%
Local government	0.8%	1.5%	0.9%	0.8%	1.1%	1.0%	-1.7%	-0.6%
State government	1.9%	2.5%	2.0%	2.1%	4.0%	0.8%	2.4%	-7.7%
U.S. military service	0.6%	0.4%	0.5%	0.3%	0.1%	-0.1%	-1.2%	0.6%
U.S. government (civilian employee)	7.8%	7.1%	7.7%	8.5%	6.8%	-0.3%	3.2%	1.0%
Other employer type	0.4%	0.3%	0.3%	0.2%	0.2%	0.1%	1.6%	-0.5%
Region of employment						-1.7%	15.9%	-4.1%
New England	7.5%	9.0%	7.8%	8.2%	7.4%	0.2%	0.5%	0.1%
[Middle Atlantic]**	17.0%	19.2%	17.5%	16.7%	14.7%	--	--	--
East North Central	14.4%	13.6%	14.3%	12.1%	14.3%	-0.2%	-4.9%	0.0%
West North Central	6.2%	5.8%	6.1%	7.4%	5.5%	-0.1%	4.0%	0.6%
South Atlantic	19.0%	20.0%	19.2%	17.4%	19.9%	0.2%	-3.8%	-0.5%
East South Central	4.4%	3.4%	4.2%	4.5%	4.4%	-0.6%	1.4%	-0.3%
West South Central	8.5%	6.9%	8.1%	10.7%	11.2%	-0.6%	8.0%	-2.8%
Mountain	6.5%	5.0%	6.1%	7.8%	7.9%	-0.5%	5.5%	-1.7%
Pacific	16.1%	16.7%	16.3%	14.2%	14.4%	0.0%	0.0%	0.0%
Other U.S	0.2%	0.4%	0.2%	1.0%	0.3%	0.1%	7.2%	-0.1%
Non-U.S	0.1%	0.1%	0.1%	0.0%	0.0%	-0.1%	-2.1%	0.5%
Type of work						14.9%	-0.2%	20.6%
Occupation						2.6%	-9.6%	11.3%
Computer scientist	2.9%	1.4%	2.6%	3.0%	2.9%	-0.1%	0.3%	-0.1%
Mathematical scientist	1.2%	0.9%	1.2%	0.4%	0.7%	0.0%	0.4%	-0.1%
Postsecondary teacher—math/computers	4.5%	2.6%	4.2%	4.7%	4.5%	0.1%	-0.3%	0.0%
Agricultural scientist	1.8%	1.2%	1.7%	2.0%	1.6%	-0.3%	1.4%	0.1%
Biological scientist	8.9%	15.6%	10.3%	8.1%	5.2%	3.3%	-9.9%	6.6%
Environmental scientist	0.2%	0.1%	0.2%	0.2%	0.2%	0.0%	0.0%	0.0%
Postsecondary teacher—life sciences	6.9%	7.6%	6.9%	8.7%	8.2%	0.1%	2.6%	-0.6%
Chemist	5.4%	3.5%	5.1%	3.5%	4.1%	-0.8%	-5.8%	1.1%
Geoscientist	1.9%	0.9%	1.8%	1.2%	1.3%	-0.4%	-1.9%	0.5%
Physicist/astronomer	3.4%	0.9%	3.0%	1.6%	2.3%	-0.8%	-3.9%	0.6%
Other physical scientist	0.4%	0.1%	0.3%	0.2%	0.6%	-0.1%	-0.4%	-0.2%
Postsecondary teacher—physical sciences	5.3%	2.6%	4.8%	5.2%	5.9%	-0.6%	0.8%	-0.6%

See explanatory information and SOURCE at end of table.

Appendix table 5-32: Variable means and percent of the doctoral science and engineering salary gaps, as explained for women compared with men, and persons with disabilities compared with persons without disabilities: 1993

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	Variable means					Percent of salary gap explained		
	Sex		Disability					
Characteristics	Men	Women	None	At degree	After degree	Women compared with men	Disability at degree compared with no disability	Disability after degree compared with no disability
Economist	1.1%	1.2%	1.2%	0.9%	0.3%	0.0%	-0.5%	0.5%
Political scientist	0.1%	0.2%	0.2%	0.2%	0.2%	0.0%	0.0%	0.0%
Psychologist	3.1%	8.8%	4.1%	4.3%	2.1%	1.7%	0.4%	1.6%
Sociologist/anthropologist	0.4%	1.1%	0.5%	0.3%	0.2%	0.0%	-0.1%	0.0%
Other social scientist	0.3%	0.7%	0.4%	0.6%	0.3%	0.2%	1.1%	0.1%
Postsecondary teacher—social sciences	8.4%	13.7%	9.2%	12.1%	14.0%	0.2%	1.0%	-0.5%
Aeronautical, aerospace engineer	0.8%	0.1%	0.7%	0.3%	1.0%	-0.2%	-1.0%	-0.2%
Chemical engineer	1.5%	0.4%	1.3%	1.2%	0.4%	-0.4%	-0.3%	1.0%
Civil engineer	0.6%	0.1%	0.5%	0.8%	0.4%	-0.3%	2.0%	0.1%
Electrical/electronic engineer	2.5%	0.5%	2.2%	1.5%	2.3%	-0.2%	-0.6%	0.0%
Industrial engineer	0.1%	0.0%	0.1%	0.3%	0.0%	0.0%	0.6%	0.1%
Mechanical engineer	1.4%	0.1%	1.1%	1.1%	0.5%	-0.4%	-0.1%	0.6%
Other engineer	3.4%	1.6%	3.0%	4.2%	1.9%	-0.6%	3.8%	1.1%
Engineering teacher	4.4%	1.0%	3.8%	2.2%	5.5%	0.9%	3.6%	1.2%
Non-S&E ("low status")	6.7%	9.8%	7.2%	6.5%	8.9%	1.4%	-2.9%	-1.9%
|Non-S&E ("high status")|**	22.4%	22.9%	22.4%	24.6%	24.7%	--	--	--
How closely job is related to degree						-0.5%	4.5%	-1.8%
|Closely related|**	67.4%	71.0%	68.3%	64.4%	63.0%	--	--	--
Somewhat related	26.0%	23.5%	25.4%	28.2%	29.2%	-0.2%	2.1%	-0.8%
Not related	6.7%	5.5%	6.4%	7.4%	7.8%	-0.3%	2.3%	-1.0%
Primary work activity						0.8%	18.8%	-8.3%
Accounting, finance, contracts	0.8%	0.7%	0.8%	1.1%	1.0%	0.0%	-0.3%	0.1%
|Applied research|**	22.1%	19.0%	21.8%	16.7%	16.6%	--	--	--
Basic research	15.0%	17.1%	15.6%	13.4%	10.9%	0.1%	-1.3%	0.8%
Computer applications, programming, systems development	4.6%	2.1%	4.1%	4.3%	3.1%	-0.6%	0.4%	0.7%
Development	5.7%	3.2%	5.2%	5.3%	4.8%	-0.1%	0.0%	0.1%
Design of equipment, processes, structures, models	2.6%	0.9%	2.3%	2.0%	2.8%	-0.3%	-0.4%	-0.2%
Employee relations	0.7%	1.1%	0.8%	0.9%	0.6%	0.0%	0.1%	0.0%
Management and administration	15.3%	12.3%	14.6%	15.3%	19.6%	-0.3%	0.5%	-1.3%
Production, operations, maintenance	0.3%	0.2%	0.3%	0.6%	0.1%	-0.1%	3.3%	0.5%
Professional services	6.3%	12.6%	7.5%	7.7%	6.2%	0.1%	0.0%	0.1%
Sales, purchasing, marketing	1.2%	0.7%	1.1%	2.3%	0.6%	0.0%	-0.4%	-0.1%
Quality or productivity management	0.9%	0.8%	0.9%	0.6%	1.0%	0.0%	-0.2%	0.0%
Teaching	22.6%	26.9%	23.1%	27.3%	31.0%	1.9%	16.6%	-9.1%
Other work activity	1.9%	2.5%	2.0%	2.5%	1.8%	0.1%	0.5%	0.1%
Secondary work activity						1.0%	-0.2%	0.2%
Accounting, finance, contracts	2.3%	1.4%	2.1%	3.1%	2.5%	0.1%	-1.0%	0.1%
Applied research	17.9%	16.5%	17.7%	17.7%	15.9%	0.1%	0.0%	-0.2%
|Basic research|	14.5%	14.9%	14.6%	14.7%	14.2%	--	--	--
Computer applications, programming, systems development	8.2%	5.1%	7.6%	6.6%	8.3%	-0.2%	-0.6%	-0.1%
Development	7.3%	4.7%	6.8%	5.3%	7.3%	0.2%	1.0%	0.1%

See explanatory information and SOURCE at end of table.

Appendix table 5-32: Variable means and percent of the doctoral science and engineering salary gaps, as explained for women compared with men, and persons with disabilities compared with persons without disabilities: 1993

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	Variable means					Percent of salary gap explained		
	Sex		Disability					
Characteristics	Men	Women	None	At degree	After degree	Women compared with men	Disability at degree compared with no disability	Disability after degree compared with no disability
Design of equipment, processes, structures, models	4.6%	2.1%	4.1%	4.0%	4.6%	-0.1%	0.0%	0.0%
Employee relations	4.4%	5.7%	4.6%	4.9%	4.0%	0.1%	0.2%	0.1%
Management and administration	13.6%	14.9%	13.9%	13.4%	11.9%	0.1%	-0.2%	0.2%
Production, operations, maintenance	0.4%	0.2%	0.4%	0.1%	0.2%	-0.1%	-1.9%	0.2%
Professional services	2.6%	4.5%	2.9%	3.2%	2.1%	-0.1%	-0.1%	-0.1%
Sales, purchasing, marketing	1.8%	1.0%	1.6%	1.7%	3.3%	0.1%	-0.1%	0.7%
Quality or productivity management	1.7%	1.5%	1.7%	1.8%	1.9%	0.0%	0.2%	-0.1%
Teaching	11.9%	13.8%	12.2%	12.6%	12.7%	0.2%	0.4%	-0.1%
Other work activity	1.7%	2.6%	1.9%	1.7%	2.2%	0.0%	0.0%	0.0%
No secondary activity	7.1%	10.9%	7.7%	9.0%	8.8%	0.7%	2.1%	-0.5%
Managerial position	11.9%	9.0%	11.3%	10.9%	14.7%	0.9%	1.2%	2.7%
Log number of direct supervisees	0.6357	0.4725	0.6043	0.6106	0.6743	1.8%	-0.6%	2.0%
Log number of indirect supervisees	0.1759	-0.1305	0.1216	0.1092	0.0817	3.7%	1.3%	-1.3%
Postdoctoral appointment*	3.7%	7.1%	4.5%	3.2%	0.2%	4.7%	-15.5%	15.7%
"Life choices"						10.6%	5.0%	4.7%
Marital status						6.6%	15.1%	2.6%
[Married]**	83.5%	63.4%	79.9%	74.4%	82.1%	--	0.0%	0.0%
Widowed	0.5%	1.3%	0.6%	0.8%	0.8%	0.3%	0.7%	-0.2%
Separated	1.2%	1.3%	1.2%	1.6%	1.1%	0.0%	0.8%	0.1%
Divorced	5.8%	12.7%	6.9%	9.8%	9.5%	1.9%	7.1%	-1.8%
Never married	9.1%	21.4%	11.4%	13.5%	6.5%	4.4%	6.5%	4.6%
Spouse's work status						2.2%	-5.0%	0.3%
Spouse work full-time?*	37.7%	54.5%	40.8%	39.4%	40.3%	3.3%	-2.5%	0.3%
Spouse work part-time?*	17.1%	3.9%	14.8%	11.5%	14.7%	-1.1%	-2.5%	0.0%
[Spouse not working or no spouse]**	45.2%	41.7%	44.4%	49.1%	45.0%	--	0.0%	0.0%
Spouse in natural science/engineering?*	16.1%	32.5%	19.2%	17.4%	15.2%	1.1%	-1.1%	0.7%
Reason not working in Ph.D. field:								
Family-related reasons	1.1%	1.7%	1.2%	1.0%	1.5%	0.2%	-0.8%	-0.2%
Reasons for changing employer/occupation:								
Working conditions	11.7%	17.4%	12.8%	16.0%	7.4%	-0.7%	-3.7%	-1.9%
School-related reasons	9.3%	17.3%	11.0%	10.3%	2.1%	0.8%	-0.6%	2.3%
Reasons that would increase interest in research abroad:								
Better financial support	57.1%	61.0%	57.9%	59.1%	54.8%	0.4%	1.1%	0.8%
Reasons for taking workshops or seminars:								
Required by employer	21.1%	20.6%	21.1%	22.8%	15.5%	0.0%	1.1%	1.0%
Reasons for taking college or university courses:								
Further education before starting career	2.5%	2.9%	2.6%	2.5%	2.8%	0.1%	-0.1%	-0.1%
Change in occupation/field	5.4%	6.4%	5.5%	4.6%	8.1%	0.1%	-1.0%	-0.8%

KEY: *Dummy variables. All dummy variables are named so that 1 indicates possession of the trait and 0 its absence, e.g., 1 on MBA indicates the person's highest degree after completion of the doctorate was an MBA.

** This dummy variable was omitted from the regression equation to avoid overspecification of the model. The regression coefficients for the remaining dummy variables listed for this variable can accordingly be interpreted as deviations from this omitted category.

*** Type of employer sums to more than 100 percent, because it merges two closely related SDR variables. See the Technical Notes for more information.

-- = No parameters for cell because variable excluded from model.

SOURCE: National Science Foundation/SRS. 1993 Survey of Doctorate Recipients.

Appendix table 5-33. Doctoral scientists and engineers in the U.S. labor force, by race/ethnicity, field of doctorate, and citizenship status: 1993

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Race/ethnicity and field of doctorate	All	U.S. native	U.S. naturalized	Non-U.S., permanent visa	Non-U.S., temporary visa
All races/ethnicities:					
Total science and engineering	470,500	383,030	48,900	29,360	9,210
Sciences	394,070	335,440	32,570	19,500	6,550
Computer and mathematical sciences	28,260	21,210	3,090	2,960	1,000
Life and related sciences	126,460	108,580	10,480	5,200	2,200
Physical and related sciences	100,660	81,570	10,950	5,740	2,390
Social and related sciences	138,690	124,080	8,050	5,600	960
Engineering	76,440	47,590	16,340	9,860	2,660
White:					
Total science and engineering	396,700	364,610	19,400	10,530	2,160
Sciences	342,440	318,820	14,490	7,550	1,580
Computer and mathematical sciences	22,740	20,430	1,170	900	240
Life and related sciences	110,370	103,620	4,300	1,980	460
Physical and related sciences	85,010	78,490	4,290	1,750	480
Social and related sciences	124,330	116,280	4,740	2,910	400
Engineering	54,260	45,790	4,910	2,980	580
Black:					
Total science and engineering	9,760	6,810	1,170	1,440	340
Sciences	8,730	6,370	880	1,200	270
Computer and mathematical sciences	400	250	--	90	--
Life and related sciences	2,410	1,700	350	230	120
Physical and related sciences	1,060	720	60	210	90
Social and related sciences	4,850	3,710	420	680	--
Engineering	1,030	440	290	240	70
Hispanic:					
Total science and engineering	9,600	5,530	2,270	1,450	350
Sciences	8,190	5,010	1,820	1,110	250
Computer and mathematical sciences	740	290	180	220	50
Life and related sciences	2,250	1,380	520	250	110
Physical and related sciences	1,870	1,070	430	320	50
Social and related sciences	3,330	2,280	690	320	--
Engineering	1,410	520	460	340	100
Asian:					
Total science and engineering	52,660	4,380	26,010	15,920	6,360
Sciences	33,100	3,680	15,340	9,640	4,440
Computer and mathematical sciences	4,310	180	1,700	1,750	680
Life and related sciences	11,030	1,490	5,300	2,730	1,500
Physical and related sciences	12,430	1,040	6,150	3,460	1,780
Social and related sciences	5,340	980	2,190	1,690	480
Engineering	19,560	700	10,670	6,290	1,910
American Indian:					
Total science and engineering	1,780	1,710	50	--	--
Sciences	1,610	1,560	--	--	--
Computer and mathematical sciences	70	70	--	--	--
Life and related sciences	410	390	--	--	--
Physical and related sciences	290	260	--	--	--
Social and related sciences	840	840	--	--	--
Engineering	180	150	--	--	--

KEY: -- = fewer than 50 estimated

NOTE: Because of rounding, details may not add to totals.

SOURCE: National Science Foundation/SRS. 1993 Survey of Doctorate Recipients.

Appendix table 5-34. 1992 bachelor's science and engineering graduates, by sex, race/ethnicity, disability status, employment status, and graduate school status: 1993

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Sex, race/ethnicity, and disability status	Total graduates	Employment status					Graduate school status		
		Full-time employed in field[1]	Full-time employed outside field	Part-time employed	Not employed but seeking work	Not employed and not seeking work	Part-time student	Full-time student	Nonstudent
Total science and engineering	330,900	148,400	63,700	27,100	11,200	8,600	28,100	71,900	231,000
Sex:									
Men	184,000	88,800	33,800	12,600	6,700	3,600	14,300	38,500	131,200
Women	146,900	59,600	29,900	14,600	4,500	5,000	13,800	33,300	99,800
Race/ethnicity:									
White, non-Hispanic	266,900	120,900	52,600	21,600	9,000	7,400	22,200	55,400	189,300
Black, non-Hispanic	23,900	10,200	5,200	2,800	600	-	2,200	4,900	16,800
Hispanic	13,800	5,900	2,400	800	-	-	1,300	3,800	8,700
Asian	25,400	11,000	3,100	1,800	1,200	600	2,500	7,700	15,200
American Indian	900	-	-	-	-	-	-	-	900
Disability status:									
Persons with disabilities	34,700	16,500	6,300	3,700	1,300	800	3,000	6,000	25,700
Persons without disabilities	296,200	131,900	57,300	23,400	10,000	7,800	25,100	65,800	205,300

[1] Current work is "closely related" or "somewhat related" to degree field.

KEY: - = fewer than 500 estimated

NOTES: Employment status excludes full-time students. Because of rounding, details may not add to totals.

SOURCE: National Science Foundation/SRS. 1993 National Survey of Recent College Graduates.

Appendix table 5-35. Employed 1992 bachelor's science and engineering graduates, by occupation, race/ethnicity, and disability status: 1993

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Field of occupation	Total	Race/ethnicity					Disability status	
		White, non-Hispanic	Black, non-Hispanic	Hispanic	Asian	American Indian	Persons with disabilities	Persons without disabilities
Total employed graduates	239,200	195,100	18,200	9,200	15,900	900	26,600	212,600
Science and engineering	65,700	51,700	3,900	2,700	5,000	-	6,800	58,300
Computer and mathematical sciences	18,800	13,100	2,100	900	2,700	-	2,300	16,500
Life and related sciences	5,400	4,600	-	-	-	-	-	5,100
Physical sciences	5,600	4,800	-	-	-	-	-	5,300
Social and related sciences	5,800	4,400	700	-	-	-	1,000	4,800
Engineering	30,100	24,800	1,100	1,800	2,300	-	3,500	26,600
Non-science and -engineering	173,400	143,400	13,800	4,800	10,200	600	18,900	154,400
Management and related	23,900	20,100	1,200	-	2,200	-	2,500	21,400
Health and related	6,200	4,800	700	-	600	-	600	5,600
Education other than S&E postsecondary	16,800	13,600	2,000	800	500	-	1,700	15,100
Social services and related	14,000	10,300	2,300	900	500	-	2,200	11,700
Technical, computer programming	18,500	15,600	900	-	1,600	-	1,500	17,000
Sales and marketing	28,300	24,100	1,600	900	1,800	-	2,100	26,200
Other occupations	65,700	54,900	5,100	2,200	3,000	500	8,300	57,400

KEY: - = fewer than 500 estimated

NOTES: Employment status excludes full-time students. Because of rounding, details may not add to totals.

SOURCE: National Science Foundation/SRS. 1993 National Survey of Recent College Graduates.

Appendix table 5-36. Labor force participation and unemployment rates for doctoral scientists and engineers, by race/ethnicity and disability status: 1993

Page 1 of 1

Race/ethnicity and disability status	Total	Labor force	Not in labor force	Working for pay or profit	Full-time employed	Part-time employed	Labor force participation rate	Unemployment rate
Total	513,460	470,500	42,960	462,870	433,330	29,540	91.6	1.6
Race/ethnicity:								
White	436,820	396,700	40,120	390,430	363,720	26,710	90.8	1.6
Asian	54,590	52,660	1,930	51,670	49,900	1,770	96.5	1.9
Black	10,140	9,760	380	9,620	9,180	440	96.3	1.3
Hispanic	10,040	9,600	440	9,420	8,880	540	95.6	1.9
American Indian	1,870	1,780	90	1,730	1,650	80	95.2	2.8
Disability status:								
Persons without disabilities	482,241	446,760	35,481	439,688	412,709	26,980	92.6	1.6
Persons with disabilities	31,222	23,743	7,479	23,178	20,621	2,557	76.0	2.4

NOTE: Because of rounding, details may not add to totals.

SOURCE: National Science Foundation/SRS. 1993 Survey of Doctorate Recipients.

Appendix table 5-37. Full-time science and engineering faculty, by race/ethnicity, age, institution type, and number of presentations and publications in the past 2 years: 1993

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Race/ethnicity, age, and institution type	Refereed articles	Nonrefereed articles	Creative works	Book reviews and chapters	Textbooks, books, monographs, and reports	Presentations	Patents and software
White, non-Hispanic	2.56	0.80	0.35	0.82	1.43	3.58	0.18
Younger than 35 years old	2.18	0.57	0.27	0.57	1.05	3.20	0.18
35 to 44 years old	3.21	0.75	0.38	0.90	1.42	4.18	0.15
45 to 54 years old	2.24	0.83	0.36	0.80	1.75	3.36	0.24
55 to 64 years old	2.24	0.94	0.30	0.80	1.19	3.68	0.13
65 to 70 years old	3.64	0.52	0.43	1.07	0.90	1.76	0.21
71 years old or older	1.66	0.45	0.02	0.57	0.71	1.51	0.10
Research	4.71	1.37	0.47	1.29	2.02	5.56	0.23
Doctorate	3.49	0.90	0.40	0.98	1.95	4.64	0.22
Comprehensive	1.22	0.50	0.24	0.54	1.02	2.42	0.17
Liberal arts	1.16	0.42	0.36	0.73	0.71	2.53	0.15
Public, 2-year	0.17	0.15	0.17	0.19	0.62	0.97	0.09
Other	1.09	0.60	0.42	0.59	1.44	2.32	0.15
Asian	3.85	0.88	0.30	0.55	1.59	3.50	0.20
Younger than 35 years old	3.55	0.62	0.29	0.49	1.54	4.70	0.11
35 to 44 years old	4.13	0.67	0.46	0.65	2.22	3.87	0.34
45 to 54 years old	4.07	1.07	0.08	0.50	1.13	3.17	0.21
55 to 64 years old	3.29	1.23	0.04	0.45	1.17	2.70	0.05
65 to 70 years old	4.23	0.68	2.46	1.00	0.92	1.65	0.00
71 years old or older	0.48	1.44	0.00	0.50	1.92	1.44	0.00
Research	5.79	1.51	0.21	0.71	2.16	4.59	0.29
Doctorate	5.80	0.96	0.36	0.86	2.10	5.54	0.11
Comprehensive	1.86	0.33	0.54	0.40	0.66	2.24	0.13
Liberal arts	0.72	0.23	0.29	0.21	0.52	1.20	0.00
Public, 2-year	0.16	0.13	0.09	0.12	0.31	0.78	0.07
Other	1.08	0.35	0.16	0.16	3.29	1.20	0.59
Black, non-Hispanic	1.12	0.45	0.53	0.53	1.05	2.83	0.10
Younger than 35 years old	0.64	0.51	1.01	0.23	0.65	3.14	0.17
35 to 44 years old	1.55	0.48	0.32	0.95	1.57	4.01	0.17
45 to 54 years old	1.11	0.54	0.76	0.43	0.84	2.41	0.08
55 to 64 years old	0.72	0.31	0.39	0.32	0.87	2.05	0.01
65 to 70 years old	1.40	0.19	0.00	0.13	0.96	0.96	0.00
71 years old or older	0.00	0.00	0.00	0.00	0.00	0.24	0.00
Research	2.90	0.67	0.17	1.14	1.84	6.41	0.24
Doctorate	1.69	0.83	1.64	1.20	1.67	4.05	0.08
Comprehensive	0.97	0.49	0.63	0.35	0.85	2.42	0.10
Liberal arts	0.72	0.28	0.33	0.51	1.31	1.57	0.00
Public, 2-year	0.10	0.17	0.27	0.10	0.48	1.24	0.05
Other	0.00	0.00	0.00	0.00	0.00	0.00	0.31

See explanatory information and SOURCE at end of table.

Appendix table 5-37. Full-time science and engineering faculty, by race/ethnicity, age, institution type, and number of presentations and publications in the past 2 years: 1993

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Race/ethnicity, age, and institution type	Refereed articles	Nonrefereed articles	Creative works	Book reviews and chapters	Textbooks, books, monographs, and reports	Presentations	Patents and software
Hispanic	2.01	0.80	0.96	0.89	2.49	3.37	0.13
Younger than 35 years old	2.43	0.31	0.00	0.42	0.34	3.59	0.23
35 to 44 years old	2.60	0.51	1.26	0.90	4.11	3.46	0.16
45 to 54 years old	1.34	0.34	0.33	0.47	2.12	2.98	0.06
55 to 64 years old	1.91	3.66	3.50	2.94	2.38	3.97	0.00
65 to 70 years old	0.89	0.25	0.76	0.58	3.58	2.43	0.48
71 years old or older	1.00	1.52	0.00	0.00	0.00	3.55	0.00
Research	4.78	0.73	0.27	1.10	2.90	4.43	0.27
Doctorate	2.85	0.64	0.25	0.79	0.59	3.11	0.16
Comprehensive	1.68	1.82	2.44	1.65	4.98	3.90	0.06
Liberal arts	1.09	0.72	0.21	1.16	0.28	4.83	0.00
Public, 2-year	0.17	0.00	0.48	0.07	1.10	2.27	0.08
Other	0.82	0.14	0.39	0.31	0.69	1.58	0.31
American Indian	1.52	0.55	0.35	0.28	2.65	4.46	0.00
Younger than 35 years old	1.07	0.00	0.00	0.00	1.60	2.13	0.00
35 to 44 years old	3.66	1.25	0.44	0.56	6.22	9.86	0.00
45 to 54 years old	0.20	0.39	0.00	0.11	1.57	1.38	0.00
55 to 64 years old	0.11	0.11	0.40	0.13	0.10	1.32	0.00
65 to 70 years old	1.00	2.00	5.00	2.00	10.00	6.00	0.00
71 years old or older	1.00	0.00	0.00	0.00	1.00	0.00	0.00
Research	3.82	4.55	0.27	1.82	0.91	4.91	0.00
Doctorate	3.58	0.01	0.21	0.99	8.84	5.97	0.00
Comprehensive	1.99	1.04	0.43	0.02	2.16	8.22	0.00
Liberal arts	0.00	0.39	0.00	0.00	0.00	1.96	0.00
Public, 2-year	0.04	0.04	0.41	0.00	0.40	0.91	0.00

NOTES: Because of rounding, details may not add to totals. Data are preliminary.

SOURCE: U.S. Department of Education/NCES. 1993 National Study of Postsecondary Faculty.

Appendix table 5-38. Full-time science and engineering faculty, by race/ethnicity, type of school, and actual and preferred time in activities: 1993

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Race/ethnicity and type of school	Total	Actual time allocation (percent distribution)				Preferred time allocation (percent distribution)			
		Teaching	Research	Administration	Other activity	Teaching	Research	Administration	Other activity
Total	211,000	49.9	25.3	12.8	11.8	44.9	32.1	7.8	14.9
Research	70,200	33.3	42.2	13.2	11.1	30.9	48.1	7.4	13.3
Doctorate	32,400	41.3	34.8	11.9	11.8	37.1	41.6	6.8	14.2
Comprehensive	48,500	59.5	15.6	12.7	11.9	50.9	25.0	8.2	15.5
Liberal arts	14,700	62.0	13.5	13.9	10.1	55.1	22.3	8.0	14.3
Public, 2-year	36,500	70.0	4.2	12.1	13.7	65.1	8.8	8.4	17.7
Other	8,700	58.0	15.0	15.1	11.9	52.0	21.3	10.2	16.5
White, non-Hispanic	181,600	49.6	25.0	13.3	11.8	45.0	31.7	8.1	15.0
Research	61,600	32.7	41.9	13.8	11.2	30.4	47.8	7.8	13.6
Doctorate	28,000	41.4	33.8	12.4	12.2	37.7	40.6	7.1	14.4
Comprehensive	40,100	59.6	15.1	13.2	11.8	51.4	24.4	8.4	15.5
Liberal arts	13,000	62.1	13.5	13.7	10.1	56.1	22.1	7.5	14.0
Public, 2-year	31,300	69.8	4.0	12.7	13.5	65.5	8.3	8.8	17.4
Other	7,600	58.6	13.5	15.5	12.4	52.8	19.6	10.5	17.2
Asian	15,600	49.3	33.5	7.6	9.6	41.4	41.6	4.8	12.0
Research	6,200	38.0	45.9	7.3	8.8	34.3	52.9	3.4	9.5
Doctorate	2,700	39.9	45.6	6.1	8.4	31.9	53.0	3.6	11.5
Comprehensive	3,700	61.6	19.9	7.0	11.5	49.1	30.3	5.6	14.2
Liberal arts	600	59.7	13.8	18.8	7.7	46.0	22.8	14.1	17.1
Public, 2-year	1,700	74.0	8.0	6.7	11.4	63.0	15.3	5.1	16.6
Other	700	52.1	27.5	12.2	8.1	42.5	37.6	9.3	10.6
Black, non-Hispanic	8,100	54.9	17.6	13.0	14.3	47.6	25.4	9.3	17.5
Research	1,300	31.9	37.9	13.2	16.9	34.0	41.9	6.8	17.3
Doctorate	800	45.8	26.9	14.3	13.0	40.6	34.7	9.4	15.3
Comprehensive	3,100	58.7	14.7	12.8	13.4	47.9	24.9	9.4	17.6
Liberal arts	1,000	63.1	10.7	14.2	11.9	48.1	24.2	11.3	16.4
Public, 2-year	1,700	66.0	5.6	12.1	16.3	59.8	10.1	10.0	19.7
Other	-	50.7	26.7	11.8	10.8	58.5	19.9	7.2	14.4
Hispanic	4,800	54.0	22.6	9.2	14.2	47.1	29.8	5.8	17.2
Research	1,000	40.3	41.2	8.8	9.7	35.7	45.9	6.2	12.2
Doctorate	800	37.7	41.6	9.8	10.9	30.7	49.4	5.7	14.2
Comprehensive	1,400	54.4	18.5	12.6	14.5	47.6	27.0	9.0	16.4
Liberal arts	-	48.8	31.3	10.9	9.0	49.8	30.0	4.6	15.6
Public, 2-year	1,400	71.2	3.5	5.7	19.6	62.5	10.9	3.0	23.6
Other	-	65.7	16.1	10.3	7.9	52.9	32.9	2.2	12.0
American Indian	800	59.5	18.0	11.2	11.3	59.1	21.3	4.8	14.7
Research	-	60.4	20.9	9.1	9.6	31.8	49.6	0.0	18.7
Doctorate	-	41.9	37.6	14.9	5.6	44.4	36.7	7.9	10.9
Comprehensive	-	43.8	27.5	14.3	14.4	50.1	27.9	7.4	14.5
Liberal arts	-	73.3	6.3	3.8	16.6	65.2	9.8	3.4	21.6
Public, 2-year	-	79.5	1.4	8.0	11.2	76.1	6.6	1.9	15.5

KEY: - = fewer than 500 estimated

NOTES: Because of rounding, details may not add to totals. Data are preliminary.

SOURCE: U.S. Department of Education/NCES. 1993 National Study of Postsecondary Faculty.

Appendix 5-39. Primary work activity of employed bachelor's and master's scientists and engineers, by race/ethnicity and disability status: 1993

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		Race/ethnicity					Disability status	
Degree and primary work activity	Total	White	Asian	Black	Hispanic	American Indian	Persons without disabilities	Persons with disabilities
Bachelor's:								
Total, all activities	1,558,000	1,357,000	94,000	60,000	44,000	3,000	1,474,545	84,487
Accounting, finance	36,000	32,000	2,000	1,000	1,000	-	33,695	2,103
Applied research	125,000	110,000	7,000	5,000	4,000	-	119,562	6,206
Basic research	23,000	18,000	2,000	2,000	1,000	-	21,624	1,428
Computer applications	451,000	387,000	33,000	19,000	12,000	1,000	429,092	22,452
Development	121,000	106,000	7,000	4,000	3,000	-	115,644	5,875
Design of equipment	238,000	211,000	15,000	4,000	8,000	1,000	225,161	12,839
Employee relations	16,000	13,000	1,000	1,000	1,000	-	15,701	579
Management and administration	175,000	157,000	7,000	6,000	5,000	-	166,899	8,381
Production, operations, maintenance	65,000	55,000	5,000	4,000	1,000	-	60,518	4,796
Professional services	57,000	52,000	2,000	2,000	1,000	-	52,705	4,851
Sales, purchasing, marketing	70,000	62,000	3,000	3,000	1,000	-	65,202	4,479
Quality/productivity management	59,000	49,000	4,000	4,000	2,000	-	56,505	2,912
Teaching	11,000	9,000	1,000	1,000	-	-	10,207	899
Other	109,000	96,000	5,000	3,000	4,000	-	102,030	6,687
Master's:								
Total, all activities	673,000	557,000	81,000	17,000	17,000	1,000	643,411	30,040
Accounting, finance	12,000	10,000	1,000	-	-	-	10,281	1,318
Applied research	90,000	78,000	8,000	2,000	2,000	-	86,312	4,228
Basic research	9,000	7,000	1,000	-	1,000	-	8,680	388
Computer applications	160,000	121,000	30,000	5,000	4,000	-	152,540	7,399
Development	55,000	45,000	8,000	1,000	1,000	-	53,816	1,338
Design of equipment	86,000	69,000	13,000	2,000	3,000	-	83,273	3,119
Employee relations	9,000	7,000	1,000	-	-	-	7,919	599
Management and administration	79,000	69,000	6,000	3,000	2,000	-	74,946	4,287
Production, operations, maintenance	11,000	9,000	2,000	-	-	-	11,009	299
Professional services	66,000	60,000	3,000	2,000	1,000	-	62,623	3,575
Sales, purchasing, marketing	23,000	20,000	2,000	-	-	-	22,121	407
Quality/productivity management	22,000	19,000	2,000	1,000	-	-	21,222	686
Teaching	6,000	5,000	-	-	-	-	5,279	234
Other	45,000	39,000	4,000	1,000	1,000	-	43,390	2,163

KEY: - = fewer than 500 estimated

NOTE: Because of rounding, details may not add to totals.

SOURCE: National Science Foundation/SRS. 1993 National Survey of College Graduates.

Appendix table 5-40. Doctoral scientists and engineers employed in business or industry, by primary work activity and race/ethnicity: 1993

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Primary work activity	All	White	Black	Hispanic	Asian	American Indian
Total	141,190	112,680	1,950	2,300	23,860	400
Research and development	71,850	54,980	910	1,170	14,640	150
Teaching	810	690	--	--	90	--
Management, sales, and administration	34,910	29,410	430	550	4,380	140
Computer applications	12,560	8,930	120	250	3,220	--
Other activities	21,070	18,670	480	320	1,530	70
	Percent distribution					
Research and development	50.9	48.8	46.7	50.9	61.4	37.5
Teaching	0.6	0.6	--	--	0.4	--
Management, sales, and administration	24.7	26.1	22.1	23.9	18.4	35.0
Computer applications	8.9	7.9	6.2	10.9	13.5	--
Other activities	14.9	16.6	24.6	13.9	6.4	17.5

KEY: -- = fewer than 50 estimated/percent distribution not available

NOTES: The business or industry classification excludes individuals who reported self-employment.
Because of rounding, details may not add to totals.

SOURCE: National Science Foundation/SRS. 1993 Survey of Doctorate Recipients.

Appendix table 5-41: Variable means and percent of the doctoral science and engineering salary gaps explained for blacks, Hispanics, Asians, and American Indians compared with whites: 1993

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Characteristics	Variable means: White	Variable means: Black	Variable means: Hispanic	Variable means: Asian	Variable means: American Indian	Percent of salary gap explained: Black	Percent of salary gap explained: Hispanic	Percent of salary gap explained: Asian	Percent of salary gap explained: American Indian
Salary	$61,700	$54,600	$56,000	$57,600	$55,200				
Dependent variable:									
Log of salary	11.0305	10.9084	10.9326	10.9610	10.9189				
Independent variables						108.0%	103.3%	76.6%	57.3%
Years since receipt of Ph.D.1						32.5%	44.0%	65.2%	1.9%
Years since receipt of Ph.D.	15.4	11.6	11.5	11.4	15.2	54.1%	69.0%	101.0%	2.6%
Years since receipt of Ph.D. squared	322.1	198.5	206.8	205.2	318.1	-21.6%	-25.1%	-35.9%	-0.8%
Field of degree						2.9%	-10.9%	-62.3%	13.3%
Main effects						13.6%	-4.3%	-64.9%	15.0%
Computer science	1.0%	0.8%	1.8%	2.8%	0.5%	0.6%	-2.3%	-7.7%	1.5%
Mathematical sciences	5.3%	3.9%	6.7%	5.4%	4.0%	1.0%	-1.3%	-0.2%	1.0%
Agricultural sciences	3.4%	2.8%	3.3%	2.9%	1.6%	-0.1%	0.0%	-0.1%	-0.3%
[Biological sciences]**	24.8%	22.8%	20.9%	17.6%	17.6%	--	--	--	--
Environmental sciences	1.0%	0.3%	0.5%	0.2%	3.1%	0.1%	0.1%	0.3%	-0.4%
Chemistry	11.7%	8.7%	12.4%	13.6%	11.6%	2.0%	-0.5%	-2.1%	0.1%
Geosciences	3.1%	0.4%	2.1%	1.4%	1.2%	1.5%	0.7%	1.6%	1.1%
Physics/astronomy	7.7%	2.8%	6.3%	8.8%	4.2%	5.3%	1.9%	-2.1%	4.2%
Other physical sciences	0.3%	0.0%	0.0%	0.2%	0.4%	0.1%	0.1%	0.1%	0.0%
Economics	4.4%	6.0%	4.9%	3.3%	4.0%	-2.2%	-0.8%	2.8%	0.7%
Political science	3.3%	7.8%	2.0%	1.2%	3.9%	-0.9%	0.3%	0.7%	-0.1%
Psychology	12.4%	20.1%	13.7%	1.9%	19.8%	-1.3%	-0.3%	3.0%	-1.3%
Sociology/anthropology	4.5%	9.1%	5.7%	1.1%	11.1%	2.1%	0.7%	-2.7%	3.2%
Other social sciences	2.6%	4.3%	4.5%	2.0%	7.4%	-0.7%	-1.0%	0.5%	-2.3%
Aeroengineering	0.6%	0.7%	0.7%	0.9%	0.3%	-0.1%	-0.1%	-0.7%	0.5%
Chemical engineering	2.2%	1.0%	2.5%	5.4%	0.0%	2.1%	-0.6%	-9.9%	4.3%
Electrical engineering	4.7%	4.2%	5.2%	12.5%	3.9%	0.8%	-1.0%	-21.9%	1.4%
Industrial engineering	0.4%	0.2%	0.4%	0.8%	0.7%	0.3%	0.0%	-1.4%	-0.5%
Mechanical engineering	1.7%	0.8%	1.6%	5.4%	1.2%	1.3%	0.1%	-9.0%	0.7%
Other engineering	4.8%	3.4%	5.0%	12.4%	3.7%	1.6%	-0.3%	-16.1%	1.4%
Interaction with years since degree						-10.7%	-6.6%	2.7%	-1.7%
Computer science	6.6%	3.9%	8.0%	14.3%	0.6%	-0.2%	0.1%	0.9%	-0.4%
Mathematical sciences	93.6%	61.7%	109.6%	63.0%	83.5%	-0.5%	0.3%	-0.8%	-0.2%
Agricultural sciences	48.8%	30.0%	32.8%	38.2%	19.2%	-0.5%	-0.5%	-0.5%	-0.9%
[Biological sciences]**	354.8%	272.2%	231.4%	196.7%	221.8%	--	--	--	--
Environmental sciences	14.5%	1.8%	3.8%	2.6%	33.6%	-0.3%	-0.3%	-0.4%	0.4%
Chemistry	204.9%	115.6%	150.1%	171.0%	243.2%	-2.4%	-1.8%	-1.6%	1.1%
Geosciences	47.5%	6.4%	21.9%	14.8%	11.2%	-0.3%	-0.3%	-0.5%	-0.3%
Physics/astronomy	138.0%	41.1%	86.9%	107.2%	93.2%	-2.2%	-1.4%	-1.2%	-1.1%
Other physical sciences	2.5%	0.5%	0.3%	1.2%	6.6%	-0.1%	-0.1%	-0.1%	0.2%
Economics	70.3%	70.6%	65.0%	34.3%	90.1%	0.0%	0.0%	-0.1%	0.0%
Political science	53.2%	102.5%	21.6%	15.8%	60.5%	-0.3%	0.3%	0.4%	-0.1%
Psychology	173.6%	191.6%	136.2%	20.1%	272.3%	0.4%	-1.0%	-5.7%	2.3%
Sociology/anthropology	67.3%	115.0%	65.0%	13.0%	168.0%	-0.3%	0.0%	0.7%	-0.8%
Other social sciences	37.0%	43.2%	40.5%	23.0%	87.4%	0.2%	0.1%	-0.8%	1.8%
Aeroengineering	10.9%	7.8%	7.6%	9.7%	4.6%	-0.1%	-0.1%	-0.1%	-0.2%
Chemical engineering	36.4%	7.4%	25.2%	69.5%	0.0%	-1.1%	-0.5%	2.2%	-1.5%
Electrical engineering	75.0%	45.9%	63.0%	144.6%	51.9%	-1.3%	-0.7%	5.5%	-1.1%
Industrial engineering	5.1%	1.2%	3.7%	9.1%	1.5%	-0.1%	0.0%	0.2%	-0.1%
Mechanical engineering	26.1%	7.2%	16.1%	53.7%	15.8%	-0.6%	-0.4%	1.4%	-0.3%
Other engineering	71.5%	36.4%	64.5%	136.2%	55.7%	-1.0%	-0.2%	3.2%	-0.5%

See explanatory information and SOURCE at end of table.

Appendix table 5-41: Variable means and percent of the doctoral science and engineering salary gaps explained for blacks, Hispanics, Asians, and American Indians compared with whites: 1993

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Characteristics	Variable means					Percent of salary gap explained			
	White	Black	Hispanic	Asian	American Indian	Black	Hispanic	Asian	American Indian
Other work-related characteristics						29.4%	39.2%	84.5%	-0.1%
Age when doctorate received						18.6%	10.9%	13.3%	14.4%
Age at Ph.D.	31.10	34.16	32.32	32.01	33.36	81.6%	40.7%	42.5%	66.0%
Age at Ph.D. squared	988.98	1201.45	1069.51	1045.03	1147.98	-63.0%	-29.8%	-29.2%	-51.6%
Whether attended professional society meeting or conference within the past year*	81.7%	83.6%	82.8%	82.7%	76.3%	-0.7%	-0.5%	-0.6%	2.0%
Number of professional societies or associations belonged to	2.7	3.0	2.8	2.1	3.2	-2.5%	-0.8%	11.4%	-5.5%
Highest degree since doctorate*						0.4%	1.2%	0.8%	1.4%
MBA	0.7%	0.7%	0.7%	1.9%	0.1%	0.0%	0.0%	-0.8%	0.3%
Master's	1.0%	1.1%	1.0%	1.5%	0.4%	0.0%	0.0%	0.4%	-0.4%
Other doctorate	0.2%	0.6%	0.3%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%
JD,LLB,LLM	0.4%	1.1%	0.3%	0.1%	0.3%	-0.8%	0.1%	0.6%	0.1%
MD	1.3%	0.4%	0.7%	0.9%	0.2%	1.2%	1.0%	0.8%	1.6%
Other professional degree	0.2%	0.2%	0.1%	0.1%	0.0%	0.0%	-0.1%	-0.2%	-0.2%
Other degree	0.1%	0.1%	0.4%	0.1%	0.0%	0.0%	0.2%	0.0%	-0.1%
Bachelor's degree	0.1%	0.0%	0.0%	0.0%	0.0%	-0.1%	-0.1%	-0.1%	-0.1%
[No degree]**	95.9%	95.9%	96.5%	95.0%	99.0%	--	--	--	--
Taken courses since last degree?*	23.6%	21.9%	22.7%	19.4%	22.9%	-0.3%	-0.2%	-1.2%	-0.1%
Previously retired?*	2.5%	3.8%	3.8%	1.7%	2.6%	0.9%	1.1%	-0.9%	0.1%
Full-time experience						9.2%	20.7%	45.5%	-9.6%
Years full-time experience	17.6	15.7	14.6	12.8	19.2	16.6%	34.1%	76.2%	-15.7%
Years full-time experience squared	407.2	338.1	305.9	243.1	459.5	-7.4%	-13.5%	-30.7%	6.1%
Have employment-related license?*	17.7%	21.2%	18.3%	10.4%	27.3%	-0.7%	-0.2%	2.7%	-2.2%
Same occupation?*	73.5%	64.3%	60.7%	60.2%	73.6%	3.0%	5.2%	7.6%	0.0%
Employed in 1988?*	95.5%	92.1%	92.0%	87.3%	96.8%	1.4%	1.8%	6.0%	-0.6%
Employer characteristics						34.7%	16.4%	-63.1%	43.5%
Type of employer***						30.3%	3.2%	-53.0%	30.1%
2-year college	1.4%	2.3%	2.3%	0.7%	2.0%	1.9%	2.4%	-2.4%	1.4%
Research institution I	21.5%	18.7%	23.4%	20.2%	20.8%	-4.0%	3.3%	-3.3%	-1.0%
Research institution II	4.5%	2.9%	5.2%	3.8%	6.3%	-2.7%	1.6%	-2.2%	3.6%
Doctorate granting I	2.6%	4.2%	2.1%	2.2%	1.3%	3.0%	-1.2%	-1.4%	-2.7%
Doctorate granting II	3.2%	3.5%	4.0%	2.1%	4.9%	0.5%	2.0%	-3.8%	3.8%
Comprehensive I	8.5%	16.2%	9.8%	5.6%	16.6%	16.2%	3.4%	-10.8%	18.6%
Comprehensive II	0.7%	1.4%	1.0%	0.3%	1.6%	1.8%	0.9%	-1.5%	2.8%
Liberal arts I	2.2%	2.1%	2.0%	0.3%	1.8%	-0.3%	-0.6%	-6.9%	-1.0%
Liberal arts II	1.7%	4.5%	1.1%	1.2%	1.0%	8.4%	-2.3%	-2.6%	-2.4%
Medical school (Carnegie classification)	2.7%	2.1%	3.3%	2.1%	2.3%	-0.7%	1.0%	-1.5%	-0.6%
Medical school (self-classification)	8.2%	7.7%	9.4%	7.0%	8.0%	0.1%	-0.3%	0.3%	0.0%
Health related schools that are not medical schools	0.4%	0.8%	0.3%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%
Univ.-affiliated research institute	4.4%	4.4%	6.2%	5.3%	10.6%	0.0%	0.2%	0.1%	0.5%
Other educational institution	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Elementary/mid/secondary school	1.1%	2.3%	1.6%	0.3%	2.7%	2.1%	1.0%	-2.4%	3.1%
Private, for-profit company	29.2%	18.2%	25.2%	46.6%	19.4%	--	--	--	--
Private, not-for-profit organization	5.5%	4.9%	4.8%	4.3%	2.6%	-0.8%	-1.2%	-3.0%	-4.3%
Local government	0.9%	2.8%	0.8%	0.7%	2.0%	4.8%	-0.3%	-0.7%	3.2%
State government	2.1%	2.8%	1.2%	1.1%	4.1%	1.8%	-3.0%	-4.7%	5.8%
U.S. military service	0.6%	0.7%	0.7%	0.2%	0.3%	0.2%	0.1%	-0.7%	-0.3%
U.S. Government (civilian employee)	8.1%	6.7%	7.0%	5.0%	7.4%	-1.1%	-1.1%	-4.5%	-0.7%
Other employer type	0.3%	0.6%	1.3%	0.5%	0.1%	-0.8%	-2.8%	-1.0%	0.4%

See explanatory information and SOURCE at end of table.

Appendix table 5-41: Variable means and percent of the doctoral science and engineering salary gaps explained for blacks, Hispanics, Asians, and American Indians compared with whites: 1993

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Characteristics	Variable means					Percent of salary gap explained			
	White	Black	Hispanic	Asian	American Indian	Black	Hispanic	Asian	American Indian
Region of employment						4.4%	13.2%	-10.0%	13.4%
New England	7.9%	6.0%	8.2%	6.9%	7.0%	-0.4%	0.1%	-0.4%	-0.2%
[Middle Atlantic]**	17.1%	16.0%	15.0%	20.6%	9.3%	--	--	--	--
East North Central	14.3%	11.8%	10.3%	14.7%	15.3%	-1.2%	-2.4%	0.3%	0.5%
West North Central	6.5%	4.5%	4.7%	4.4%	6.3%	-1.4%	-1.6%	-2.5%	-0.1%
South Atlantic	19.3%	33.2%	17.2%	16.5%	9.0%	6.4%	-1.2%	-2.2%	-5.2%
East South Central	4.3%	6.9%	3.0%	3.2%	10.1%	2.9%	-1.9%	-2.2%	7.1%
West South Central	8.1%	8.6%	10.6%	8.5%	16.2%	0.3%	2.1%	0.5%	5.8%
Mountain	6.7%	2.4%	7.5%	3.2%	13.5%	-3.0%	0.7%	-4.4%	5.3%
Pacific	15.6%	10.0%	16.0%	21.7%	13.1%	0.0%	0.0%	0.0%	0.0%
Other U.S.	0.1%	0.3%	7.4%	0.1%	0.2%	0.3%	17.4%	-0.2%	0.2%
Non-U.S.	0.1%	0.2%	0.1%	0.3%	0.1%	0.4%	0.1%	1.1%	0.0%
Type of work						-1.2%	12.6%	55.6%	1.4%
Occupation						-7.5%	0.0%	11.7%	-6.8%
Computer scientist	2.4%	1.3%	2.4%	4.4%	2.2%	-0.2%	0.0%	0.6%	0.0%
Mathematical scientist	1.1%	0.8%	0.8%	1.6%	0.1%	0.0%	0.1%	-0.1%	0.1%
Postsecondary teacher— math/computers	4.0%	3.7%	6.4%	5.1%	3.7%	0.0%	-0.3%	-0.2%	0.0%
Agricultural scientist	1.8%	0.6%	1.7%	1.3%	1.8%	-1.2%	-0.1%	-0.9%	0.0%
Biological scientist	10.0%	6.5%	10.5%	11.8%	8.4%	-3.3%	0.6%	3.0%	-1.7%
Environmental scientist	0.2%	0.1%	0.0%	0.1%	0.0%	-0.1%	-0.3%	-0.3%	-0.2%
Postsecondary teacher—life sciences	7.6%	6.0%	5.1%	3.6%	3.9%	-0.5%	-1.0%	-2.2%	-1.3%
Chemist	4.8%	3.5%	4.4%	7.3%	2.0%	-1.0%	-0.4%	3.6%	-2.4%
Geoscientist	1.9%	0.1%	2.1%	1.1%	1.1%	-1.3%	0.2%	-1.0%	-0.6%
Physicist/astronomer	2.9%	1.2%	2.5%	3.7%	0.3%	-1.0%	-0.3%	0.9%	-1.7%
Other physical scientist	0.3%	0.0%	0.1%	0.8%	0.3%	-0.2%	-0.1%	0.4%	0.0%
Postsecondary teacher—physical sciences	5.0%	4.3%	6.1%	3.3%	7.6%	-0.3%	0.5%	-1.2%	1.1%
Economist	1.1%	1.4%	1.7%	1.1%	0.5%	0.1%	0.3%	0.0%	-0.3%
Political scientist	0.2%	0.1%	0.2%	0.0%	0.3%	0.0%	0.0%	0.0%	0.0%
Psychologist	4.5%	6.2%	6.6%	0.7%	5.3%	1.0%	1.5%	-3.6%	0.5%
Sociologist/anthropologist	0.5%	0.8%	1.2%	0.2%	1.5%	0.0%	0.1%	-0.1%	0.1%
Other social scientist	0.4%	0.3%	0.1%	0.2%	0.2%	-0.1%	-0.4%	-0.4%	-0.2%
Postsecondary teacher—social sciences	9.9%	18.2%	11.0%	3.8%	24.5%	0.6%	0.1%	-0.7%	1.1%
Aeronautical, aerospace engineer	0.6%	0.2%	0.5%	1.9%	0.0%	-0.2%	0.0%	1.2%	-0.3%
Chemical engineer	1.0%	0.9%	1.5%	3.1%	0.0%	-0.1%	0.5%	3.0%	-0.9%
Civil engineer	0.3%	0.4%	0.4%	1.7%	0.3%	0.1%	0.1%	2.8%	0.0%
Electrical/electronic engineer	1.6%	0.9%	1.3%	6.5%	4.0%	-0.1%	-0.1%	1.5%	0.5%
Industrial engineer	0.1%	0.0%	0.0%	0.3%	0.0%	0.0%	0.0%	0.3%	0.0%
Mechanical engineer	0.8%	0.2%	1.0%	3.8%	1.0%	-0.4%	0.2%	3.6%	0.2%
Other engineer	2.6%	1.3%	2.0%	6.4%	0.1%	-0.9%	-0.5%	4.8%	-2.0%
Engineering teacher	3.5%	3.6%	4.1%	5.7%	3.5%	0.0%	-0.4%	-1.9%	0.0%
Non-S&E ("low status")	7.3%	9.4%	7.2%	6.5%	8.8%	1.7%	-0.1%	-1.2%	1.4%
[Non-S&E ("high status")]**	23.7%	27.9%	19.1%	14.1%	18.4%	--	--	--	--
How closely job is related to degree						-1.4%	-1.4%	-0.1%	-2.1%
[Closely related]**	68.0%	74.2%	71.4%	66.7%	75.3%	--	--	--	--
Somewhat related	25.4%	20.4%	23.7%	27.4%	20.2%	-0.8%	-0.3%	0.5%	-0.9%
Not related	6.6%	5.4%	4.9%	5.9%	4.5%	-0.6%	-1.1%	-0.6%	-1.2%

See explanatory information and SOURCE at end of table.

Appendix table 5-41: Variable means and percent of the doctoral science and engineering salary gaps explained for blacks, Hispanics, Asians, and American Indians compared with whites: 1993

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Characteristics	Variable means					Percent of salary gap explained			
	White	Black	Hispanic	Asian	American Indian	Black	Hispanic	Asian	American Indian
Primary work activity						7.1%	0.6%	-8.2%	12.2%
Accounting, finance, contracts	0.8%	0.6%	0.8%	0.8%	0.0%	0.0%	0.0%	0.0%	0.2%
[Applied research]**	21.0%	17.1%	20.4%	26.4%	20.2%	--	--	--	--
Basic research	15.2%	8.2%	17.3%	18.4%	5.7%	-0.9%	0.4%	0.7%	-1.3%
Computer applications, programming, systems development	3.6%	2.7%	3.3%	7.9%	2.3%	-0.5%	-0.2%	3.7%	-0.7%
Development	4.6%	3.8%	4.6%	10.1%	1.8%	-0.1%	0.0%	0.8%	-0.3%
Design of equipment, processes, structures, models	2.0%	1.5%	1.9%	4.4%	0.4%	-0.2%	0.0%	1.3%	-0.6%
Employee relations	0.8%	1.3%	1.0%	0.4%	2.5%	0.1%	0.0%	-0.1%	0.2%
Management and administration	15.6%	18.4%	12.1%	8.6%	12.0%	0.5%	-0.8%	-2.2%	-0.7%
Production, operations, maintenance	0.2%	0.2%	0.1%	0.6%	0.0%	-0.1%	-0.5%	1.5%	-0.6%
Professional services	7.9%	8.7%	9.5%	3.9%	7.9%	0.0%	0.1%	-0.3%	0.0%
Sales, purchasing, marketing	1.1%	0.9%	0.7%	0.9%	0.6%	0.0%	0.0%	0.0%	0.0%
Quality or productivity management	0.9%	0.4%	1.0%	1.1%	1.3%	-0.1%	0.0%	0.0%	0.1%
Teaching	24.2%	34.0%	25.9%	15.0%	40.9%	8.2%	1.8%	-13.5%	15.3%
Other work activity	2.1%	2.3%	1.3%	1.6%	4.3%	0.1%	-0.2%	-0.2%	0.5%
Secondary work activity						0.9%	0.9%	-1.5%	0.2%
Accounting, finance, contracts	2.3%	1.7%	1.8%	1.5%	1.1%	0.1%	0.1%	0.3%	0.3%
Applied research	17.2%	16.5%	20.4%	20.9%	15.7%	0.1%	-0.3%	-0.5%	0.1%
[Basic research]	14.6%	16.5%	15.1%	14.4%	17.8%	--	--	--	--
Computer applications, programming, systems development	7.3%	4.7%	6.5%	10.6%	6.4%	-0.4%	-0.1%	0.8%	-0.1%
Development	6.3%	4.8%	6.2%	10.7%	3.7%	0.2%	0.0%	-1.1%	0.4%
Design of equipment, processes, structures, models	3.9%	2.3%	2.9%	6.6%	2.5%	-0.1%	-0.1%	0.4%	-0.1%
Employee relations	4.9%	7.2%	3.5%	2.6%	5.9%	0.3%	-0.2%	-0.5%	0.2%
Management and administration	14.7%	12.9%	12.9%	7.7%	19.9%	-0.1%	-0.2%	-0.9%	0.4%
Production, operations, maintenance	0.3%	0.1%	0.5%	0.6%	0.0%	-0.4%	0.3%	0.7%	-0.5%
Professional services	3.0%	5.3%	2.7%	1.7%	2.4%	-0.1%	0.0%	0.2%	0.0%
Sales, purchasing, marketing	1.7%	0.7%	0.6%	1.9%	1.9%	0.3%	0.4%	-0.1%	-0.1%
Quality or productivity management	1.6%	1.4%	1.6%	2.2%	0.8%	-0.1%	0.0%	0.3%	-0.3%
Teaching	12.7%	11.7%	14.3%	9.1%	10.5%	-0.2%	0.4%	-1.3%	-0.5%
Other work activity	1.9%	3.1%	1.7%	1.3%	3.0%	0.1%	0.0%	0.0%	0.0%
No secondary activity	7.6%	11.1%	9.2%	8.3%	8.2%	1.2%	0.7%	0.4%	0.2%
Managerial position*	11.9%	15.0%	9.4%	7.6%	10.1%	-1.9%	1.8%	4.5%	1.2%
Log number of direct supervisees	0.6421	0.5804	0.5838	0.3639	0.6552	1.3%	1.5%	10.2%	-0.3%
Log number of indirect supervisees	0.1642	0.1912	0.0290	-0.1820	0.1706	-0.6%	3.9%	14.0%	-0.2%
Postdoctoral appointment*	3.7%	4.0%	5.2%	8.9%	2.8%	0.9%	5.2%	25.0%	-2.6%
"Life choices"						9.8%	2.1%	-3.3%	-2.8%
Marital status						8.2%	1.9%	-6.9%	-0.9%
[Married]**	79.3%	65.8%	77.1%	86.3%	79.5%	0.0%	0.0%	0.0%	0.0%
Widowed	0.6%	1.1%	0.3%	0.4%	0.1%	0.3%	-0.3%	-0.2%	-0.4%
Separated	1.2%	2.7%	1.4%	1.0%	1.8%	0.7%	0.1%	-0.1%	0.3%
Divorced	7.5%	11.9%	7.0%	2.5%	10.8%	2.3%	-0.3%	-4.6%	1.9%
Never married	11.3%	18.5%	14.1%	9.8%	7.7%	4.9%	2.4%	-1.9%	-2.7%
Spouse's work status						0.5%	-0.3%	0.1%	-0.3%
Spouse work full-time?*	40.4%	45.7%	40.4%	42.6%	39.4%	2.0%	0.0%	1.5%	-0.4%
Spouse work part-time?*	15.5%	6.4%	14.0%	10.6%	16.1%	-1.5%	-0.3%	-1.4%	0.1%
[Spouse not working or no spouse]**	44.1%	47.9%	45.6%	46.8%	44.5%	0.0%	0.0%	0.0%	0.0%
Spouse in natural science/engineering?*	17.8%	12.8%	18.3%	29.3%	19.5%	-0.6%	0.1%	2.6%	0.2%

See explanatory information and SOURCE at end of table.

Appendix table 5-41: Variable means and percent of the doctoral science and engineering salary gaps explained for blacks, Hispanics, Asians, and American Indians compared with whites: 1993

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	Variable means					Percent of salary gap explained			
Characteristics	White	Black	Hispanic	Asian	American Indian	Black	Hispanic	Asian	American Indian
Reason not working in Ph.D. field:									
Family-related reasons	1.3%	1.3%	0.9%	1.0%	0.4%	0.0%	-0.3%	-0.3%	-0.5%
Reasons for changing employer/occupation:									
Working conditions	12.6%	14.9%	17.1%	13.1%	15.6%	-0.6%	-1.4%	-0.2%	-0.8%
School-related reasons	9.9%	12.0%	15.5%	15.7%	8.9%	0.4%	1.3%	1.9%	-0.2%
Reasons which would increase interest in research abroad:									
Better financial support	57.9%	65.1%	61.3%	55.1%	62.3%	1.3%	0.8%	-0.9%	0.9%
Reasons for taking workshops or seminars:									
Required by employer	21.1%	24.4%	20.6%	19.9%	18.1%	0.4%	-0.1%	-0.3%	-0.4%
Reasons for taking college or university courses:									
Further education before starting career	2.5%	2.5%	3.2%	3.2%	0.9%	0.0%	0.3%	0.4%	-0.6%
Change in occupation/field	5.5%	6.1%	4.8%	6.0%	5.5%	0.2%	-0.2%	0.2%	0.0%

KEY: *Dummy variables. All dummy variables are named so that 1 indicates possession of the trait and 0 its absence, e.g., 1 on MBA indicates the person's highest degree after completion of the doctorate was an MBA.

** This dummy variable was omitted from the regression equation to avoid overspecification of the model. The regression coefficients for the remaining dummy variables listed for this variable can accordingly be interpreted as deviations from this omitted category.

*** Type of employer sums to more than 100 percent, because it merges two closely related SDR variables. See the Technical Notes for more information.

-- = No parameter for cell because variable excluded from model.

SOURCE: National Science Foundation/SRS. 1993 Survey of Doctorate Recipients.

Appendix table 5-42. Doctoral scientists and engineers in the U.S. labor force, by field of doctorate and disability status: 1993

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Field of doctorate	Total		Persons with disabilties		Persons without disabilities	
	Number	Percent	Number	Percent	Number	Percent
Total science and engineering	470,500	100.0	23,740	100.0	446,760	100.0
Sciences	394,070	83.8	20,400	85.9	373,660	83.6
Computer and mathematical sciences	28,260	6.0	1,440	6.1	26,820	6.0
Computer and information sciences	5,190	1.1	150	0.6	5,040	1.1
Mathematical science	23,070	4.9	1,290	5.4	21,790	4.9
Life and related sciences	126,460	26.9	5,830	24.6	120,630	27.0
Agricultural and food sciences	15,390	3.3	730	3.1	14,650	3.3
Biological and health sciences	107,180	22.8	4,860	20.5	102,330	22.9
Environmental science	3,880	0.8	240	1.0	3,650	0.8
Physical and related sciences	100,660	21.4	4,900	20.6	95,760	21.4
Chemistry, except biochemistry	52,710	11.2	2,560	10.8	50,150	11.2
Geology and oceanography	12,890	2.7	620	2.6	12,270	2.7
Physics and astronomy	33,930	7.2	1,620	6.8	32,310	7.2
Other physical sciences (incl earth)	1,140	0.2	100	0.4	1,040	0.2
Social and related science	138,690	29.5	8,240	34.7	130,450	29.2
Economics	19,690	4.2	1,290	5.4	18,410	4.1
Political science	14,580	3.1	1,230	5.2	13,350	3.0
Psychology	71,950	15.3	3,840	16.2	68,120	15.2
Sociology and anthropology	20,110	4.3	1,140	4.8	18,970	4.2
Other social sciences	12,350	2.6	740	3.1	11,610	2.6
Engineering	76,440	16.2	3,340	14.1	73,100	16.4
Aerospace, aeronautical	3,120	0.7	90	0.4	3,040	0.7
Chemical	11,340	2.4	410	1.7	10,930	2.4
Civil	7,100	1.5	330	1.4	6,770	1.5
Electrical, computer	19,780	4.2	920	3.9	18,850	4.2
Industrial	1,950	0.4	60	0.3	1,890	0.4
Mechanical	9,560	2.0	380	1.6	9,180	2.1
Other engineering	23,580	5.0	1,150	4.8	22,430	5.0

NOTE: Because of rounding, details may not add to totals.

SOURCE: National Science Foundation/SRS. 1993 Survey of Doctorate Recipients.

Appendix table 5-43. Doctoral scientists and engineers who reported a disability, by age at onset of disability: 1993

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Age at onset of disability	Number	Percent
Total with disability	31,220	100.0
Since birth	2,250	7.2
Younger than 10 years old	2,650	8.5
10 to 19 years old	2,980	9.5
20 to 34 years old	5,440	17.4
35 to 44 years old	5,700	18.3
45 to 54 years old	6,020	19.3
55 to 64 years old	4,100	13.1
65 to 75 years old	2,080	6.7

NOTE: Because of rounding, details may not add to totals.

SOURCE: National Science Foundation/SRS. 1993 Survey of Doctorate Recipients.

Women, Minorities, and Persons With Disabilities in Science and Engineering: 1996

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Appendix table 5-44. Doctoral scientists and engineers employed in universities and 4-year colleges, by year of doctorate, disability status, academic rank, and tenure status: 1993

Page 1 of 1

Year of doctorate and disability status	Total	Academic rank: Professor	Associate professor	Assistant professor	Other faculty	Does not apply	Tenure status: Tenured	Tenure-track, not tenured	Not in track, not tenured	Tenure not applicable
Total:										
All years	190,640	72,020	45,160	38,380	9,330	25,750	105,750	34,470	17,210	33,210
1985–1992 graduates	60,460	1,120	8,740	29,380	4,290	16,930	7,700	25,400	9,130	18,230
Pre-1985 graduates	130,180	70,890	36,420	9,000	5,050	8,820	98,060	9,060	8,080	14,980
Disabled:										
All years	9,460	4,740	2,300	1,250	370	800	6,490	1,190	500	1,280
1985–1992 graduates	1,520	80	200	890	110	240	210	890	130	290
Pre-1985 graduates	7,940	4,660	2,110	360	260	560	6,280	300	370	990
Not disabled:										
All years	181,180	67,280	42,860	37,130	8,960	24,950	99,270	33,280	16,710	31,930
1985–1992 graduates	58,940	1,040	8,540	28,490	4,180	16,690	7,480	24,510	9,000	17,940
Pre-1985 graduates	122,240	66,240	34,310	8,640	4,780	8,260	91,780	8,770	7,710	13,990
	Percent distribution									
Total:										
All years	100.0	37.8	23.7	20.1	4.9	13.5	55.5	18.1	9.0	17.4
1985–1992 graduates	100.0	1.9	14.5	48.6	7.1	28.0	12.7	42.0	15.1	30.2
Pre-1985 graduates	100.0	54.5	28.0	6.9	3.9	6.8	75.3	7.0	6.2	11.5
Disabled:										
All years	100.0	50.1	24.3	13.2	3.9	8.5	68.6	12.6	5.3	13.5
1985–1992 graduates	100.0	5.3	13.2	58.6	7.2	15.8	13.8	58.6	8.6	19.1
Pre-1985 graduates	100.0	58.7	26.6	4.5	3.3	7.1	79.1	3.8	4.7	12.5
Not disabled:										
All years	100.0	37.1	23.7	20.5	4.9	13.8	54.8	18.4	9.2	17.6
1985–1992 graduates	100.0	1.8	14.5	48.3	7.1	28.3	12.7	41.6	15.3	30.4
Pre-1985 graduates	100.0	54.2	28.1	7.1	3.9	6.8	75.1	7.2	6.3	11.4

NOTE: Because of rounding, details may not add to totals.

SOURCE: National Science Foundation/SRS. 1993 Survey of Doctorate Recipients.

Appendix table 5-45. Doctoral scientists and engineers employed in business or industry, by age, disability status, and management work activity: 1993

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Age and disability status	Total	Management		Nonmanagement	
		Number	Percent	Number	Percent
Total:					
Persons with disabilities	6,320	1,960	31.0	4,360	69.0
Persons without disabilities	134,870	32,940	24.4	101,930	75.6
Younger than 35 years old:					
Persons with disabilities	300	100	33.3	200	66.7
Persons without disabilities	18,780	1,430	7.6	17,350	92.4
35 to 45 years old:					
Persons with disabilities	1,180	300	25.4	880	74.6
Persons without disabilities	50,400	10,650	21.1	39,750	78.9
45 years old and older:					
Persons with disabilities	4,850	1,570	32.4	3,280	67.6
Persons without disabilities	65,710	20,870	31.8	44,840	68.2

NOTES: The business or industry classification excludes individuals who reported self-employment.
Because of rounding, details may not add to totals.

SOURCE: National Science Foundation/SRS. 1993 Survey of Doctorate Recipients.

Appendix table 5-46: Regression parameters and standard errors for model used in the salary decomposition in Chapter 5 and alternative models evaluated[1]

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Characteristics	Basic model (based on total population)		Regression model for men		Regression model for women		Model including academic rank and tenure		Model including demographic variables	
	Parameters	Standard error	Parameters	Standard error	Parameters	Standard error	Parameters	Standard error	Parameters	Standard error
R^2 for the model			53%		49%		56%		54%	
Intercept	11.46888	0.05249	11.54457	0.06584	11.09604	0.09393	11.43239	0.05162	11.49271	0.05277
Years since receipt of Ph.D.1:										
Years since receipt of Ph.D.	0.01757	0.00102	0.02062	0.00124	0.00965	0.00197	0.01495	0.00102	0.01741	0.00103
Years since receipt of Ph.D. squared	-0.00021	0.00002	-0.00027	0.00003	[illegible]	0.00006	-0.00020	0.00002	-0.00021	0.00003
Field of degree										
Main effects:										
Computer science	0.30255	0.02812	0.32376	0.03203	0.21638	0.06163	0.28708	0.02768	0.29960	0.02814
Mathematical sciences	0.08972	0.01823	0.10244	0.02080	0.02478	0.04213	0.10153	0.01795	0.08479	0.01827
Agricultural sciences	-0.01914	0.01817	-0.01086	0.02106	-0.02032	0.03989	-0.01908	0.01787	-0.02184	0.01816
[Biological sciences]**										
Environmental sciences	0.02331	0.03790	0.03571	0.04256	-0.04860	0.10377	0.03188	0.03728	0.01834	0.03786
Chemistry	0.07924	0.01273	0.08421	0.01506	0.07196	0.02560	0.06263	0.01254	0.07664	0.01275
Geosciences	0.06740	0.02203	0.07082	0.02521	0.06222	0.05188	0.05667	0.02167	0.06160	0.02202
Physics/astronomy	0.13209	0.01538	0.13647	0.01718	0.13176	0.04676	0.12742	0.01513	0.12521	0.01545
Other physical sciences	0.05012	0.05286	0.04500	0.06358	0.08400	0.10337	0.03030	0.05200	0.05086	0.05279
Economics	0.17395	0.01873	0.18400	0.02170	0.14723	0.03904	0.17526	0.01844	0.17026	0.01877
Political science	0.02348	0.02062	0.02095	0.02477	0.04220	0.03715	0.03306	0.02029	0.01770	0.02061
Psychology	0.01998	0.01297	0.04703	0.01721	-0.02546	0.01897	0.01600	0.01276	0.02025	0.01298
Sociology/anthropology	-0.05447	0.01820	-0.04256	0.02449	-0.07656	0.02663	-0.04425	0.01791	-0.05259	0.01819
Other social sciences	0.05371	0.02051	0.09425	0.02699	-0.01972	0.03033	0.06034	0.02019	0.05461	0.02051
Aeroengineering	0.15678	0.04318	0.16535	0.04517	0.16663	0.42357	0.13850	0.04248	0.14803	0.04317
Chemical engineering	0.21539	0.02286	0.23198	0.02535	0.10083	0.08144	0.19351	0.02251	0.20934	0.02291
Electrical engineering	0.19535	0.01603	0.20805	0.01780	0.10899	0.06260	0.18154	0.01578	0.18742	0.01617
Industrial engineering	0.22082	0.04368	0.23342	0.05227	0.11727	0.10307	0.22687	0.04297	0.22143	0.04364
Mechanical engineering	0.16788	0.02292	0.17525	0.02476	0.15965	0.10912	0.15419	0.02255	0.16188	0.02301
Other engineering	0.14559	0.01537	0.15596	0.01732	0.06963	0.04648	0.13170	0.01513	0.14069	0.01547
Interaction with years since degree:										
Computer science	-0.00815	0.00362	-0.00970	0.00400	-0.00374	0.00933	-0.00663	0.00356	-0.00822	0.00362
Mathematical sciences	-0.00188	0.00086	-0.00263	0.00096	0.00177	0.00242	-0.00284	0.00084	-0.00176	0.00086
Agricultural sciences	-0.00324	0.00103	-0.00368	0.00115	-0.00535	0.00338	-0.00342	0.00102	-0.00320	0.00103
[Biological sciences]**										
Environmental sciences	-0.00262	0.00233	-0.00338	0.00255	0.00579	0.01192	-0.00275	0.00229	-0.00257	0.00233
Chemistry	-0.00328	0.00061	-0.00372	0.00069	-0.00273	0.00163	-0.00190	0.00060	-0.00325	0.00061
Geosciences	-0.00103	0.00114	-0.00121	0.00127	-0.00296	0.00452	-0.00002	0.00113	-0.00094	0.00114
Physics/astronomy	-0.00274	0.00072	-0.00319	0.00080	-0.00224	0.00300	-0.00223	0.00071	-0.00257	0.00073
Other physical sciences	-0.00432	0.00508	-0.00348	0.00570	-0.01174	0.01678	-0.00130	0.00500	-0.00458	0.00507
Economics	-0.00020	0.00097	-0.00097	0.00109	0.00123	0.00243	-0.00082	0.00096	-0.00017	0.00097
Political science	0.00080	0.00110	0.00080	0.00126	-0.00071	0.00245	-0.00025	0.00108	0.00099	0.00110
Psychology	-0.00260	0.00068	-0.00387	0.00085	0.00134	0.00122	-0.00224	0.00067	-0.00259	0.00068
Sociology/anthropology	0.00085	0.00103	-0.00004	0.00128	0.00370	0.00183	-0.00022	0.00101	0.00078	0.00103
Other social sciences	-0.00398	0.00125	-0.00599	0.00153	0.00157	0.00239	-0.00466	0.00123	-0.00401	0.00125
Aeroengineering	-0.00421	0.00226	-0.00494	0.00235	0.00760	0.02785	-0.00320	0.00222	-0.00402	0.00226
Chemical engineering	-0.00465	0.00111	-0.00554	0.00120	-0.00109	0.01256	-0.00301	0.00109	-0.00441	0.00111
Electrical engineering	-0.00548	0.00082	-0.00628	0.00089	0.00254	0.00648	-0.00445	0.00081	-0.00524	0.00082
Industrial engineering	-0.00294	0.00271	-0.00383	0.00304	0.00562	0.01478	-0.00347	0.00267	-0.00316	0.00271
Mechanical engineering	-0.00363	0.00126	-0.00422	0.00133	-0.00045	0.01043	-0.00253	0.00124	-0.00347	0.00126
Other engineering	-0.00344	0.00085	-0.00422	0.00093	0.00508	0.00459	-0.00267	0.00084	-0.00331	0.00085
Other work-related characteristics										
Age when doctorate received:										
Age at Ph.D.	-0.03252	0.00286	-0.03683	0.00370	-0.01551	0.00483	-0.02950	0.00282	-0.03339	0.00288
Age at Ph.D. squared	0.00036	0.00004	0.00042	0.00005	0.00016	0.00006	0.00033	0.00004	0.00038	0.00004

See explanatory information and SOURCE at end of table.

Appendix table 5-46: Regression parameters and standard errors for model used in the salary decomposition in Chapter 5 and alternative models evaluated[1]

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Characteristics	Basic model (based on total population)		Regression model for men		Regression model for women		Model including academic rank and tenure		Model including demographic variables	
	Parameters	Standard error	Parameters	Standard error	Parameters	Standard error	Parameters	Standard error	Parameters	Standard error
Whether attended professional society meeting or conference within the past year*	0.04223	0.00449	0.03793	0.00508	0.06291	0.00979	0.03720	0.00442	0.04243	0.00449
Number of professional societies or associations belonged to	0.01342	0.00083	0.01306	0.00094	0.01283	0.00176	0.01042	0.00082	0.01345	0.00083
Highest degree since doctorate*:										
MBA	0.04819	0.01743	0.02988	0.01920	0.19449	0.04457	0.05892	0.01715	0.05014	0.01743
Master's	-0.06440	0.01573	-0.06165	0.01837	-0.07607	0.02961	-0.05091	0.01548	-0.06183	0.01572
Other doctorate	0.00112	0.03260	0.02554	0.03654	-0.15940	0.07315	0.00667	0.03207	-0.00351	0.03256
JD,LLB,LLM	0.14170	0.02621	0.08592	0.03111	0.31775	0.04669	0.15338	0.02579	0.14054	0.02618
MD	0.17536	0.01653	0.15892	0.01889	0.19226	0.03414	0.19629	0.01629	0.16931	0.01653
Other professional degree	-0.07475	0.03488	-0.07374	0.04386	-0.04486	0.05350	-0.07506	0.03431	-0.07517	0.03483
Other degree	-0.06534	0.04834	-0.02738	0.05768	-0.15191	0.08686	-0.03173	0.04758	-0.06366	0.04828
Bachelor's degree	-0.08885	0.06138	-0.01668	0.07183	-0.28838	0.11337	-0.08500	0.06038	-0.08592	0.06131
(No degree)**										
Taken courses since last degree?*	-0.02026	0.00439	-0.02132	0.00504	-0.00745	0.00892	-0.02290	0.00403	-0.01918	0.00439
Previously retired?*	-0.08533	0.01082	-0.08691	0.01183	-0.06706	0.02976	-0.06230	0.01067	-0.08683	0.01081
Full-time experience:										
Years full-time experience	0.01108	0.00084	0.00870	0.00101	0.01666	0.00159	0.00997	0.00083	0.01087	0.00085
Years full-time experience squared	-0.00013	0.00002	-0.00008	0.00002	-0.00030	0.00004	-0.00012	0.00002	-0.00013	0.00002
Have employment-related license?*	0.02580	0.00535	0.01993	0.00625	0.04775	0.01027	0.02226	0.00526	0.02679	0.00534
Same occupation?*	0.03963	0.00455	0.03701	0.00529	0.04577	0.00870	0.03573	0.00450	0.03924	0.00455
Employed in 1988?*	0.05121	0.00877	0.04942	0.01057	0.04637	0.01525	0.05739	0.00864	0.04864	0.00877
Employer characteristics										
Type of employer***:										
2-year college	-0.25247	0.01521	-0.25736	0.01809	-0.22648	0.02696	-0.29560	0.01547	-0.25392	0.01519
Research institution I	-0.17250	0.00628	-0.16257	0.00720	-0.20260	0.01291	-0.22583	0.00717	-0.17206	0.00627
Research institution II	-0.21649	0.00935	-0.20952	0.01080	-0.24498	0.02007	-0.27919	0.00999	-0.21660	0.00934
Doctorate granting I	-0.23101	0.01151	-0.22450	0.01325	-0.23887	0.02286	-0.28506	0.01194	-0.22993	0.01150
Doctorate granting II	-0.24522	0.01086	-0.24531	0.01221	-0.23429	0.02168	-0.31138	0.01124	-0.24505	0.01085
Comprehensive I	-0.25483	0.00815	-0.26019	0.00945	-0.23148	0.01587	-0.32631	0.00902	-0.25499	0.00815
Comprehensive II	-0.32207	0.02077	-0.33481	0.02460	-0.28076	0.03722	-0.40538	0.02086	-0.32119	0.02075
Liberal arts I	-0.24660	0.01307	-0.25130	0.01562	-0.22158	0.02295	-0.30973	0.01344	-0.24498	0.01306
Liberal arts II	-0.36801	0.01377	-0.36481	0.01605	-0.35287	0.02608	-0.43673	0.01411	-0.36725	0.01376
Medical school (Carnegie classification)	-0.16009	0.01286	-0.16110	0.01560	-0.15407	0.02219	-0.21829	0.01326	-0.15893	0.01284
Medical school (self-classification)	0.02013	0.00799	0.03929	0.00963	-0.02337	0.01381	0.03843	0.00800	0.02090	0.00798
Health related schools that are not medical schools	0.00463	0.02521	0.03366	0.03280	-0.03216	0.03618	-0.01497	0.02486	0.00564	0.02519
Univ.-affiliated research institute	-0.00972	0.00799	-0.00880	0.00899	-0.01108	0.01771	-0.00763	0.00788	-0.00991	0.00799
Other educational institution	-0.13612	0.11004	-0.16074	0.13722	-0.07885	0.17060	-0.18493	0.10830	-0.14423	0.10988
Elementary/mid/secondary school	-0.21781	0.01698	-0.22878	0.02254	-0.19099	0.02423	-0.20993	0.01671	-0.21654	0.01697
Private, for-profit company										
Private, not-for-profit organization	-0.16322	0.00787	-0.16502	0.00925	-0.15536	0.01476	-0.15498	0.00775	-0.16333	0.00787
Local government	-0.31552	0.01749	-0.31791	0.02155	-0.30749	0.02836	-0.31421	0.01721	-0.31626	0.01747
State government	-0.32763	0.01210	-0.34956	0.01417	-0.25116	0.02262	-0.32498	0.01191	-0.32796	0.01209
U.S. military service	-0.12365	0.02249	-0.12895	0.02504	-0.08720	0.05294	-0.12256	0.02211	-0.12739	0.02246
U.S. government (civilian employee)	-0.09852	0.00718	-0.10859	0.00811	-0.04393	0.01564	-0.08770	0.00707	-0.09885	0.00718
Other employer type	0.26875	0.02933	0.25778	0.03275	0.27062	0.06791	0.28647	0.02885	0.26517	0.02934
Region of employment:										
New England	-0.02789	0.00696	-0.01908	0.00807	-0.05910	0.01338	-0.02499	0.00686	-0.02783	0.00695
(Middle Atlantic)**										
East North Central	-0.05857	0.00578	-0.06132	0.00661	-0.05344	0.01178	-0.06140	0.00568	-0.05903	0.00577
West North Central	-0.08641	0.00759	-0.09284	0.00867	-0.06719	0.01562	-0.09210	0.00747	-0.08768	0.00759
South Atlantic	-0.05627	0.00555	-0.05091	0.00639	-0.08396	0.01099	-0.05772	0.00546	-0.05690	0.00554

See explanatory information and SOURCE at end of table.

Appendix table 5-46: Regression parameters and standard errors for model used in the salary decomposition in Chapter 5 and alternative models evaluated[1]

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Characteristics	Basic model (based on total population)		Regression model for men		Regression model for women		Model including academic rank and tenure		Model including demographic variables	
	Parameters	Standard error	Parameters	Standard error	Parameters	Standard error	Parameters	Standard error	Parameters	Standard error
East South Central	-0.13805	0.00878	-0.14429	0.00989	-0.10815	0.01941	-0.14714	0.00864	-0.13914	0.00877
West South Central	-0.08024	0.00688	-0.07536	0.00780	-0.11881	0.01486	-0.08172	0.00677	-0.08048	0.00688
Mountain	-0.08648	0.00763	-0.08789	0.00862	-0.07634	0.01670	-0.09001	0.00751	-0.08710	0.00764
Pacific	0.00020	0.00562	0.00116	0.00647	-0.00471	0.01120	-0.00381	0.00553	-0.00042	0.00562
Other U.S.	-0.23462	0.03220	-0.23631	0.03368	-0.25832	0.05500	-0.24606	0.03168	-0.23752	0.03294
Non-U.S.	-0.39514	0.04493	-0.38159	0.04851	-0.61157	0.13783	-0.42526	0.04427	-0.39612	0.04487
Type of work										
Occupation:										
Computer scientist	-0.01910	0.01323	-0.02202	0.01463	0.02192	0.03404	-0.00695	0.01306	-0.01902	[illegible]
Mathematical scientist	0.01306	0.01705	0.00719	0.01911	0.05672	0.03894	0.02275	0.01679	0.01237	[illegible]
Postsecondary teacher—math/computers	0.01355	0.01268	0.01005	0.01436	0.04275	0.02953	-0.00421	0.01254	0.01127	0.01268
Agricultural scientist	-0.12528	0.01505	-0.11983	0.01679	-0.14944	0.03610	-0.12472	0.01480	-0.12720	0.01503
Biological scientist	-0.11452	0.00865	-0.10656	0.01018	-0.12599	0.01643	-0.10011	0.00855	-0.11590	0.00864
Environmental scientist	-0.13672	0.03953	-0.12821	0.04330	-0.17497	0.10553	-0.13820	0.03888	-0.13929	0.03948
Postsecondary teacher—life sciences	-0.03948	0.00913	-0.04102	0.01080	-0.02853	0.01713	-0.05975	0.00903	-0.04278	0.00913
Chemist	-0.09777	0.01117	-0.09292	0.01252	-0.10519	0.02607	-0.08545	0.01102	-0.09875	0.01116
Geoscientist	-0.08957	0.01617	-0.09043	0.01773	-0.03880	0.04456	-0.06009	0.01594	-0.09021	0.01615
Physicist/astronomer	-0.07439	0.01303	-0.07222	0.01414	-0.07075	0.04313	-0.05505	0.01285	-0.07558	0.01301
Other physical scientist	-0.06232	0.02630	-0.06087	0.03036	-0.03887	0.09397	-0.05685	0.02784	-0.06175	0.02826
Postsecondary teacher—physical sciences	-0.04833	0.01082	-0.04852	0.01226	-0.04760	0.02651	-0.07790	0.01072	-0.05065	0.01081
Economist	-0.05653	0.01864	-0.03503	0.02141	-0.12808	0.03773	-0.05443	0.01837	-0.05428	0.01863
Political scientist	-0.00483	0.04178	0.01282	0.05043	-0.04745	0.07075	-0.01428	0.04110	-0.00146	0.04173
Psychologist	-0.06775	0.01257	-0.08579	0.01586	-0.03634	0.01981	-0.05817	0.01239	-0.06903	0.01256
Sociologist/anthropologist	-0.01113	0.02474	0.01615	0.03270	-0.06069	0.03531	-0.00609	0.02434	-0.00911	0.02471
Other social scientist	-0.12603	0.02779	-0.06402	0.03614	-0.23936	0.04041	-0.11557	0.02736	-0.12599	0.02777
Postsecondary teacher—social sciences	-0.00849	0.00925	-0.00048	0.01125	-0.02314	0.01556	-0.02657	0.00916	-0.00958	0.00925
Aeronautical, aerospace engineer	-0.06625	0.02180	-0.06009	0.02301	-0.07268	0.11982	-0.04956	0.02145	-0.06386	0.02177
Chemical engineer	-0.10113	0.01905	-0.10254	0.02066	-0.01855	0.05891	-0.09393	0.01875	-0.10140	0.01903
Civil engineer	-0.14618	0.02466	-0.14188	0.02599	-0.09965	0.13377	-0.13060	0.02427	-0.14506	0.02465
Electrical/electronic engineer	-0.02100	0.01409	-0.01639	0.01514	0.00188	0.05545	-0.01085	[illegible]	-0.01840	0.01409
Industrial engineer	-0.08475	0.05708	-0.07952	0.06233	-0.11623	0.15893	-0.08586	[illegible]	-0.08517	0.05701
Mechanical engineer	-0.08227	0.01880	-0.07279	0.01994	-0.23515	0.09898	-0.07005	0.01851	-0.07982	0.01879
Other engineer	-0.08710	0.01207	-0.08332	0.01332	-0.08026	0.03212	-0.07896	0.01190	-0.08698	0.01206
Teach engineering	0.05999	0.01186	0.05873	0.01314	0.12255	0.04137	0.03187	0.01176	0.05751	0.01185
Non-S&E ("low status")	-0.10238	0.00809	-0.09728	0.00953	-0.11661	0.01490	-0.09013	0.00801	-0.10179	0.00808
[Non-S&E ("high status")]**										
How closely job is related to degree:										
[Closely related]**										
Somewhat related	-0.01933	0.00412	-0.01759	0.00469	-0.02337	0.00865	-0.01386	0.00405	-0.01900	0.00412
Not related	-0.06230	0.00807	-0.06422	0.00900	-0.05614	0.01909	-0.05741	0.00792	-0.06286	0.00806
Primary work activity;										
Accounting, finance, contracts	0.02694	0.01873	0.02401	0.02114	0.04930	0.04091	0.03276	0.01843	0.02780	0.01870
[Applied research]**										
Basic research	-0.01585	0.00647	-0.01068	0.00740	-0.04152	0.01319	-0.02381	0.00637	-0.01652	0.00646
Computer applications, programming, systems development	-0.06010	0.01001	-0.05792	0.01099	-0.07695	0.02689	-0.06383	0.00985	-0.06038	0.01000
Development	-0.01054	0.00849	-0.01124	0.00939	0.00417	0.02105	-0.00764	0.00836	-0.00974	0.00848
Design of equipment, processes, structures, models	-0.03894	0.01175	-0.04068	0.01266	0.01877	0.03774	-0.03494	0.01156	-0.04020	0.01173
Employee relations	-0.01347	0.01892	-0.02978	0.02273	0.03234	0.03263	-0.01742	0.01861	-0.01267	0.01890
Management and administration	-0.02224	0.00729	-0.01912	0.00830	-0.02981	0.01540	-0.02414	0.00717	-0.02153	0.00729
Production, operations, maintenance	-0.29273	0.03208	-0.28595	0.03566	-0.34533	0.07603	-0.29891	0.03155	-0.29567	0.03204
Professional services	-0.00505	0.00886	0.02451	0.01058	-0.09006	0.01585	0.00272	0.00873	-0.00487	0.00885
Sales, purchasing, marketing	0.00957	0.01634	0.00550	0.01796	0.03015	0.04239	0.01709	0.01608	0.00845	0.01633
Quality or productivity management	-0.02052	0.01750	-0.00657	0.01967	-0.09156	0.03855	-0.01814	0.01720	-0.01946	0.01747
Teaching	-0.10211	0.00817	-0.09494	0.00960	-0.12640	0.01535	-0.12332	0.00814	-0.09983	0.00816
Other work activity	-0.02583	0.01227	-0.02588	0.01437	-0.03094	0.02290	-0.02511	0.01206	-0.02507	0.01225

See explanatory information and SOURCE at end of table.

Appendix table 5-46: Regression parameters and standard errors for model used in the salary decomposition in Chapter 5 and alternative models evaluated[1]

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Characteristics	Basic model (based on total population)		Regression model for men		Regression model for women		Model including academic rank and tenure		Model including demographic variables	
	Parameters	Standard error	Parameters	Standard error	Parameters	Standard error	Parameters	Standard error	Parameters	Standard error
Secondary work activity:										
Accounting, finance, contracts	0.02558	0.01231	0.02980	0.01369	0.01949	0.02997	0.03195	0.01211	0.02553	0.01230
Applied research	0.01020	0.00625	0.00700	0.00713	0.02646	0.01283	0.01399	0.00615	0.01026	0.00624
[Basic research]										
Computer applications, programming, systems development	-0.01685	0.00773	-0.01658	0.00865	-0.01255	0.01787	-0.00879	0.00761	-0.01707	0.00772
Development	0.01750	0.00807	0.01630	0.00904	0.02915	0.01840	0.02712	0.00794	0.01859	0.00806
Design of equipment, processes, structures, models	-0.00890	0.00965	-0.00801	0.01063	-0.01212	0.02554	-0.00098	0.00949	-0.00901	0.00964
Employee relations	-0.01654	0.00933	-0.01308	0.01088	-0.01180	0.01770	-0.01234	0.00918	-0.01545	0.00933
Management and administration	-0.00909	0.00666	-0.00623	0.00766	-0.01142	0.01323	-0.00245	0.00656	-0.00882	0.00666
Production, operations, maintenance	-0.16161	0.02746	-0.17148	0.03044	-0.09853	0.06640	-0.15811	0.02701	-0.16347	0.02742
Professional services	0.00810	0.01091	0.02342	0.01312	-0.03621	0.01884	0.01600	0.01073	0.00820	0.01089
Sales, purchasing, marketing	0.03687	0.01371	0.03264	0.01513	0.06003	0.03536	0.05426	0.01350	0.03712	0.01370
Quality or productivity management	-0.04053	0.01356	-0.04367	0.01538	-0.00828	0.02873	-0.03035	0.01334	-0.03875	0.01354
Teaching	-0.02473	0.00812	-0.03319	0.00949	0.01387	0.01543	-0.04177	0.00803	-0.02372	0.00812
Other work activity	-0.00519	0.01259	0.00619	0.01498	-0.02017	0.02222	0.00196	0.01238	-0.00422	0.01257
No secondary activity	-0.04175	0.00771	-0.04003	0.00905	-0.04011	0.01435	-0.03359	0.00760	-0.04047	0.00770
Managerial position	0.07219	0.00729	0.07834	0.00823	0.05729	0.01583	0.09186	0.00721	0.07260	0.00728
Log number of direct supervisees	0.02550	0.00173	0.02722	0.00197	0.01584	0.00359	0.02270	0.00170	0.02531	0.00173
Log number of indirect supervisees	0.02808	0.00139	0.02799	0.00156	0.02448	0.00319	0.02776	0.00137	0.02755	0.00139
Postdoctoral appointment*	-0.33130	0.00957	-0.33098	0.01158	-0.32961	0.01636	-0.31171	0.00994	-0.32982	0.00957
"Life choices"										
Marital status:										
[Married]**										
Widowed	-0.08935	0.02099	-0.07673	0.02752	-0.02937	0.03277	-0.08212	0.02065	-0.07748	0.02657
Separated	-0.05446	0.01487	-0.06111	0.01704	0.01217	0.03215	-0.04779	0.01464	-0.06081	0.01645
Divorced	-0.06347	0.00701	-0.06726	0.00846	0.00313	0.01743	-0.05813	0.00690	-0.06863	0.00814
Never married	-0.08371	0.00601	-0.08622	0.00724	-0.01254	0.01649	-0.07688	0.00592	-0.08880	0.00694
Spouse's work status:										
Spouse work full-time?*	-0.04598	0.00461	-0.04207	0.00502	-0.00442	0.01637	-0.05037	0.00415	-0.04243	0.00466
Spouse work part-time?*	-0.01973	0.00544	-0.02161	0.00577	0.00846	0.02258	-0.02179	0.00526	-0.02293	0.00544
[Spouse not working or no spouse]**										
Spouse in natural science/engineering?*	-0.01574	0.00474	-0.01047	0.00563	-0.00548	0.00917			-0.00742	0.00482
Reason not working in Ph.D. field:										
Family-related reasons	-0.07403	0.01613	-0.09041	0.01899	-0.01392	0.03054	-0.07280	0.01587	-0.07221	0.01612
Reasons for changing employer/occupation:										
Working conditions	0.03052	0.00509	0.03484	0.00602	0.01291	0.00918	0.03104	0.00503	0.03132	0.00509
School-related reasons	-0.02340	0.00674	-0.02884	0.00814	-0.01347	0.01159	-0.02943	0.00665	-0.02241	0.00673
Reasons that would increase interest in research abroad:										
Better financial support	-0.02198	0.00346	-0.02307	0.00392	-0.01255	0.00735	-0.01913	0.00340	-0.02229	0.00346
Reasons for taking workshops or seminars:										
Required by employer	-0.01645	0.00411	-0.01894	0.00470	-0.00552	0.00842			-0.01658	0.00411
Reasons for taking college or university courses:										
Further education before starting career	-0.04204	0.01109	-0.03804	0.01281	-0.06141	0.02164	-0.04733	0.01044	-0.04337	0.01108
Change in occupation/field	-0.02912	0.00824	-0.03040	0.00955	-0.02253	0.01596			-0.02861	0.00823
Rank and tenure										
Academic rank:										
Full professor	--	--	--	--	--	--	0.16476	0.01096	--	--
Associate professor	--	--	--	--	--	--	0.04179	0.01064	--	--
Assistant professor	--	--	--	--	--	--	0.01637	0.01093	--	--
Instructor	--	--	--	--	--	--	-0.03719	0.02037	--	--
[Other rank]**	--	--	--	--	--	--	--	--	--	--

See explanatory information and SOURCE at end of table.

Appendix table 5-46: Regression parameters and standard errors for model used in the salary decomposition in Chapter 5 and alternative models evaluated[1]

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Characteristics	Basic model (based on total population)		Regression model for men		Regression model for women		Model including academic rank and tenure		Model including demographic variables	
	Parameters	Standard error	Parameters	Standard error	Parameters	Standard error	Parameters	Standard error	Parameters	Standard error
Tenure status:										
Tenured	--	--	--	--	--	--	0.05168	0.01019	--	--
In tenure track, not tenured	--	--	--	--	--	--	0.07554	0.01083	--	--
Not in tenure track	--	--	--	--	--	--	-0.06629	0.00972	--	--
[Tenure track not relevant]**	--	--	--	--	--	--	--	--	--	--
Demographic variables*:**										
Gender (Female = 1)*	--	--	--	--	--	--	--	--	-0.04602	0.00571
Disability at degree?*	--	--	--	--	--	--	--	--	-0.02041	0.01076
Disability after degree?	--	--	--	--	--	--	--	--	-0.01759	0.01059
Foreign born?*									0.01874	0.00629
Race/ethnicity*:										
[White]**	--	--	--	--	--	--	--	--		
Black*	--	--	--	--	--	--	--	--	0.03048	0.01324
Hispanic*	--	--	--	--	--	--	--	--	-0.00476	0.01574
Asian*	--	--	--	--	--	--	--	--	0.01911	0.01658
American Indian*	--	--	--	--	--	--	--	--	-0.04586	0.02499
Interactions between race/ethnicity and whether U.S. born*:										
Non-U.S. White*	--	--	--	--	--	--	--	--		
Non-U.S. Black*	--	--	--	--	--	--	--	--	-0.07823	0.02422
Non-U.S. Hispanic*	--	--	--	--	--	--	--	--	0.00288	0.02399
Non-U.S. Asian*	--	--	--	--	--	--	--	--	-0.05868	0.01825
Interactions between gender and marital status:										
[Married female]*	--	--	--	--	--	--	--	--		
Never married female*	--	--	--	--	--	--	--	--	0.03913	0.01147
Widowed female*	--	--	--	--	--	--	--	--	0.00153	0.04289
Separated female*	--	--	--	--	--	--	--	--	0.05164	0.03695
Divorced female*	--	--	--	--	--	--	--	--	0.04265	0.01398

[1] See the Technical Notes for a discussion of the alternative models.

KEY: *Dummy variables. All dummy variables are named so that 1 indicates possession of the trait and 0 its absence, e.g., 1 on MBA indicates the person's highest degree after completion of the doctorate was an MBA.

** This dummy variable was omitted from the regression equation to avoid overspecification of the model. The regression coefficients for the remaining dummy variables listed for this variable can accordingly be interpreted as deviations from this omitted category.

*** The demographic variables listed had a statistically significant association with log salary at the 0.05 level.

-- = No parameter for cell because variable excluded from model.

SOURCE: National Science Foundation/SRS. 1993 Survey of Doctorate Recipients.

END

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